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JUNE 14, 1954 VOL. 53 NO. 6

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## In Brief . . .

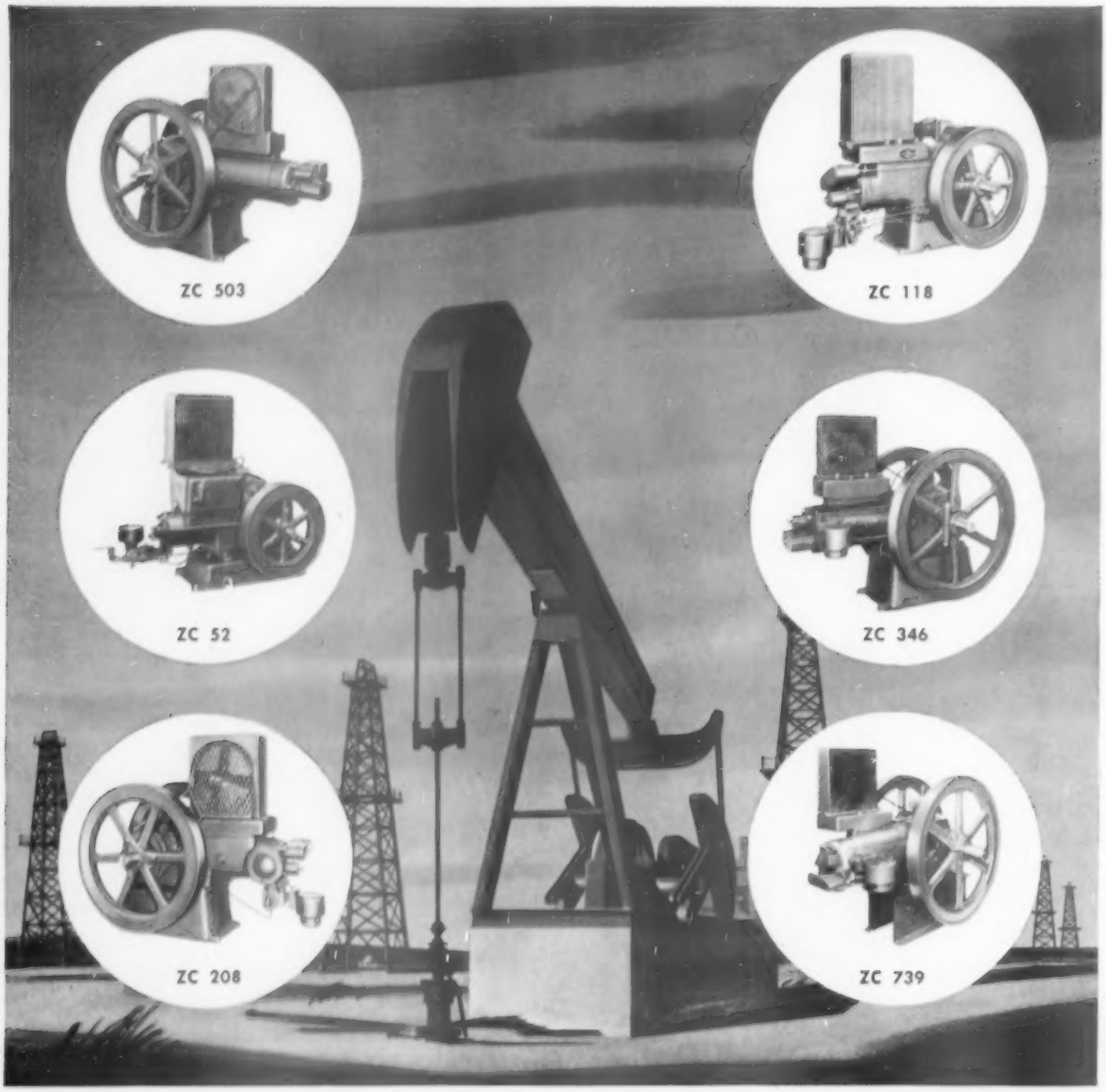
**1. NEW CORRELATION** . . . A rapid method has been developed for determining the size of fractionation equipment used to perform a proposed distillation duty. Variables considered in the correlation are: feed rate per square foot of tower cross-section, degree of fractionation, and vapor capacity. Net heat requirement per unit of feed is related to the degree of fractionation.

**2. MORE PROFITS** . . . Proper well control means not only good insurance to the operator but significant gains in lease revenue from increased oil gravities and greater volume of oil produced. Investment for control equipment of from 1 to 1½ per cent of total well investment is a good yardstick for the prudent operator to follow. Even drawdown of wells is assured and pumper labor is made more efficient.

**3. PRODUCTION BOOST** . . . Installation of electric formation heaters in Montana's Cutbank field has caused increase in production considerably above that predicted by an extension of the normal decline curve. Exact function of the heaters is not known, but it is suspected that application of heat removes paraffinic residue from the sand face and reduces reservoir fluid viscosity in the immediate vicinity of the well bore.

**4. FLEXIBLE RIG** . . . Shell's new Gulf Coast rig is designed for maximum mobility and flexibility without sacrificing performance. It is used for medium-depth drilling and can be adapted for deep-workover operations. Major rig components other than the mud pumps are unitized on two trailers.

**5. COATING QUESTION** . . . Is it economical to install a pipeline with the best coating money can buy? "No!" says L. G. Sharpe, of Humble Pipe Line Co. He maintains that optimum costs are attained with a reasonably well-coated line which can be cathodically protected with moderate current quantities. Even the best installed coatings, he says, are not free from imperfections and require cathodic protection to fully protect the pipe.

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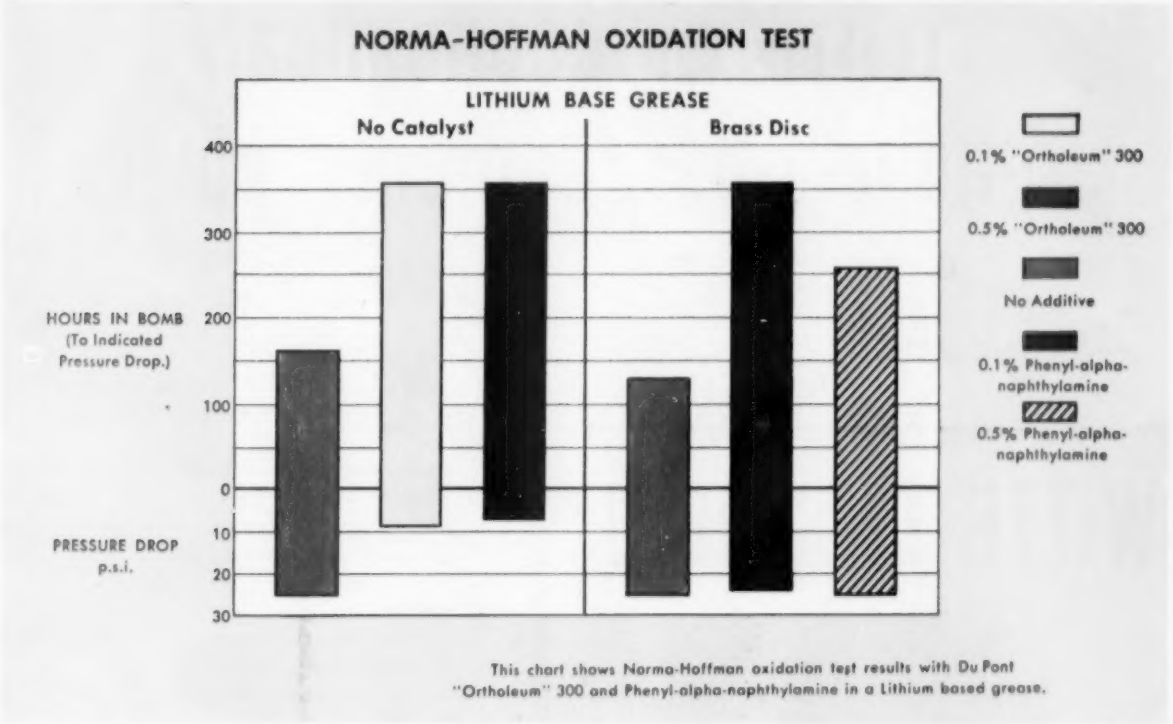


This chart shows Norma-Hoffman oxidation test results with Du Pont "Ortholeum" 300 and Phenyl-alpha-naphthylamine in a Lithium based grease.

# Multi-purpose greases with Du Pont ANTIOXIDANTS can broaden YOUR market

With the swing to multi-purpose greases gaining momentum every day, increasing the stability of your greases becomes a more pressing problem. And the problem is intensified as operating temperatures and speeds are pushed higher and higher.

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But for your grease to rate as a multi-purpose grease, it must be stabilized with a high quality antioxidant. To help you increase grease stability as economically and efficiently as possible, Du Pont offers *two* antioxidants.

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**Phenyl-alpha-naphthylamine** gives excellent results in most non-catalyzed systems where the superior color stability of "Ortholeum" 300 is not essential. Where operating conditions are not too severe and competitive pricing is important, this Du Pont antioxidant can be used to increase stability at a relatively low cost.

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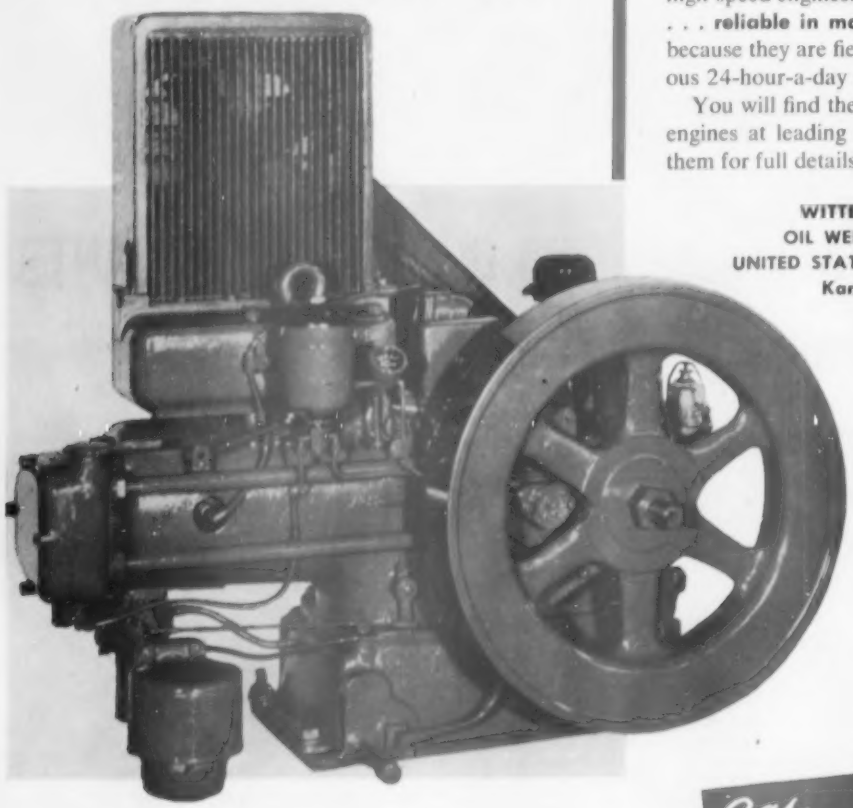

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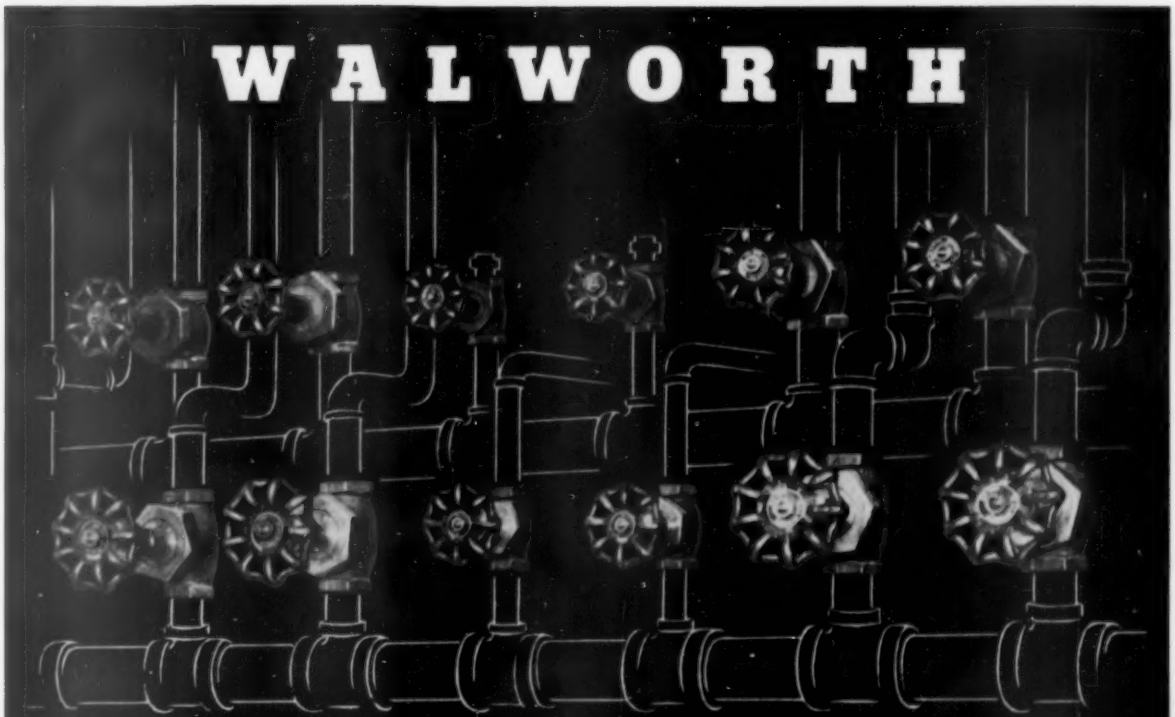

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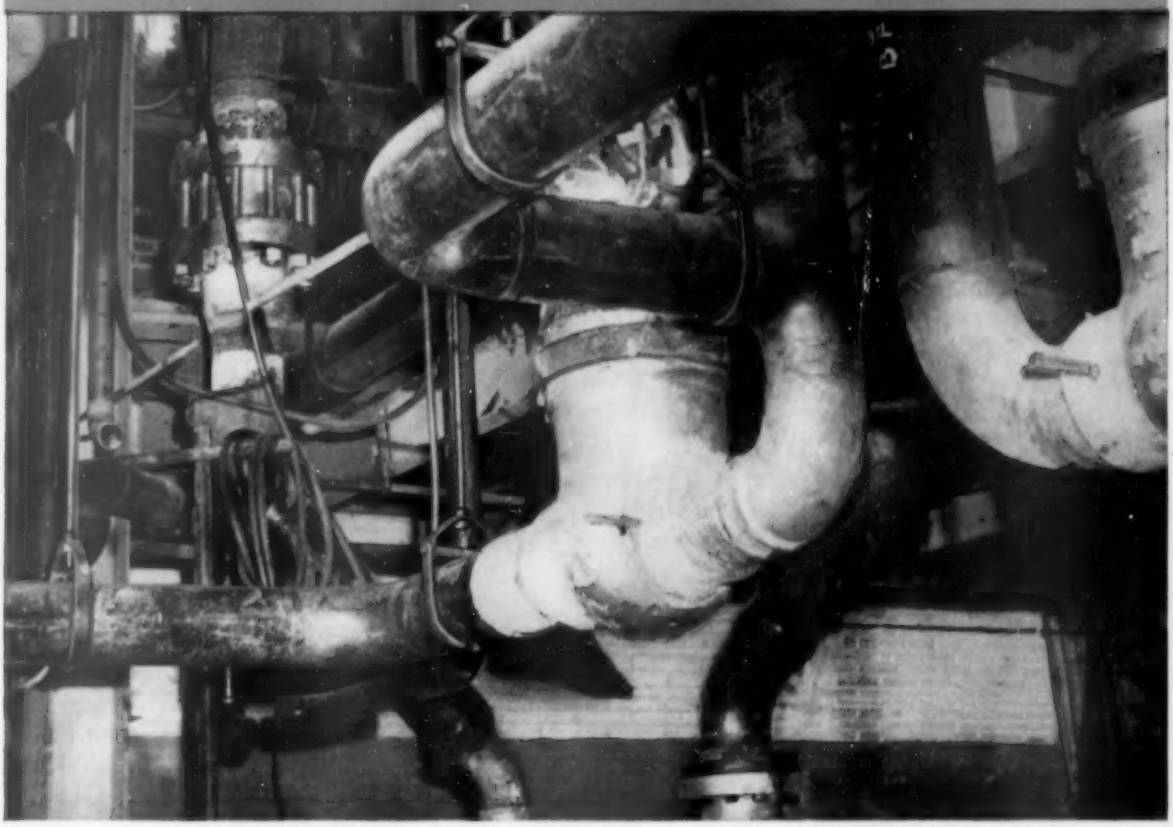

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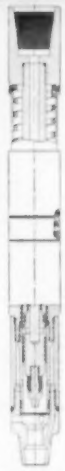

Only by approval is a service first in its field. Halliburton is first in drill stem testing with full consent of most oil operators. This consent is not easily given—for today's operators demand the most advanced techniques, the most efficient tools, the most successful performance, the most savings in time and money.

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Can be run in faster, reaches bottom easier, even in tight holes. Reduces possibility of damaging formation, prevents fluid loss to formation.

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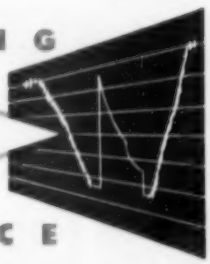

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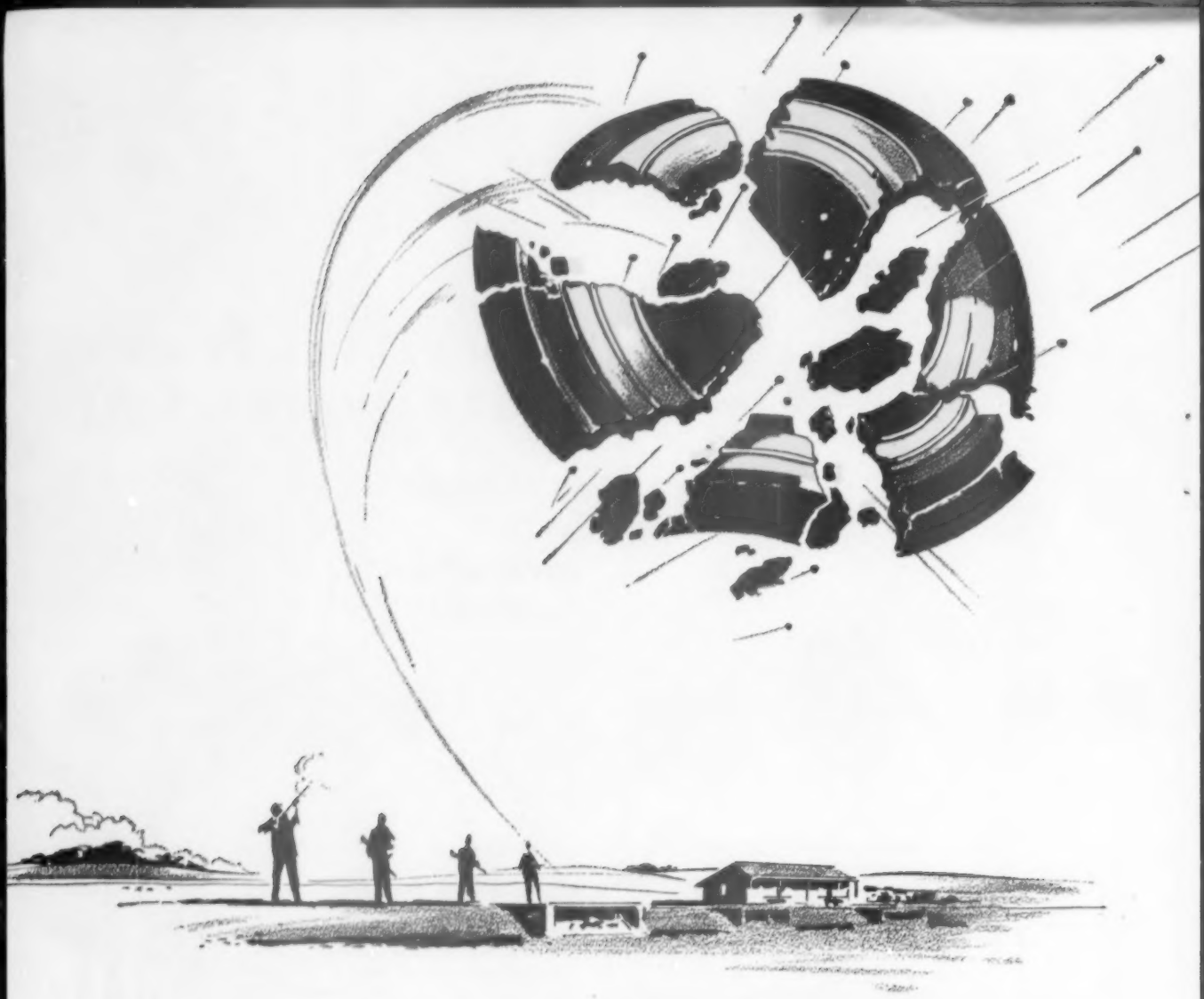

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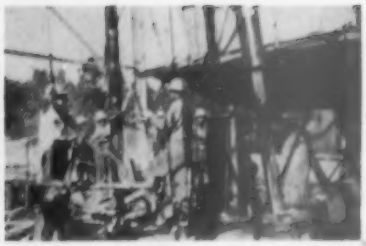

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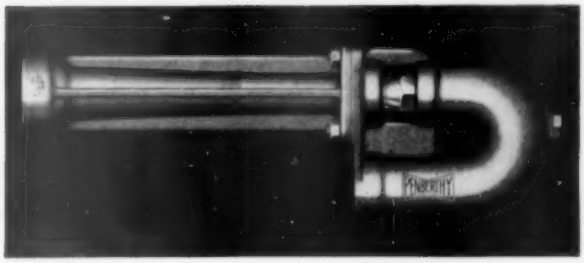

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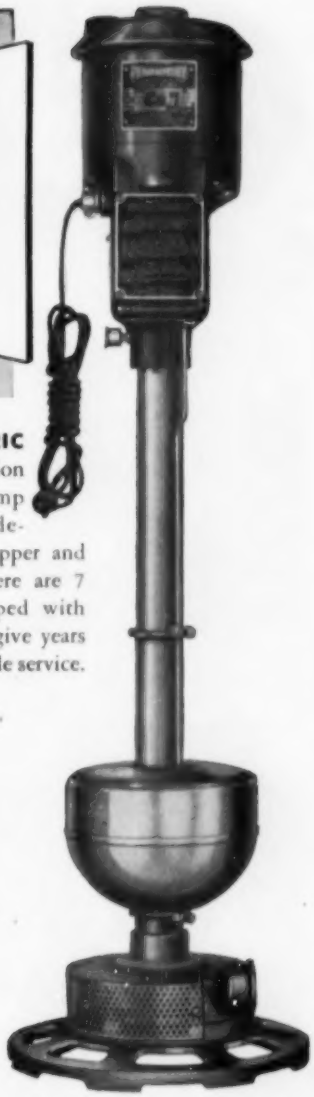

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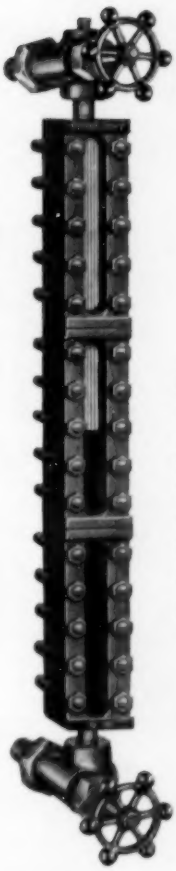

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With a primary rating of 150 lbs. for steam or 225 lbs. (non-shock) for oil, water or gas, clip gate valves are furnished in sizes from ¼" to 3", with screwed ends. Each valve is given an individual hydrostatic test at 350 lbs. before leaving the factory.

Fig. 522-C illustrated at left is furnished with bronze trim for use with steam, oil, water, gas, or chemicals which will not attack bronze. Fig. 522-C A.I., identical in construction but of all-iron, is supplied for use with caustic solutions, creosote oil, some acids, coal tar products, and many other fluids for which bronze cannot be used.

All castings used in these valves are of close-grain, hi-test gray iron, 50% stronger than ordinary iron, produced in R-P&C's own foundry. Their construction embodies quality features designed to insure long life, reduce maintenance. For example:

**bonnet**—Fully adequate drains for upper section of bonnet prevent freezing in outside installations. Male and female bonnet joint with asbestos gasket.

**U-bolt construction**—Body and bonnet held rigidly together by heavy steel U-bolt which is easily removed and replaced when valve is disassembled—U-bolt held securely in place by three sets of lugs cast on body.

**packing**—Deep stuffing box packed with formed rings of special braided asbestos packing, lubricated and graphited. Positive backseat allows re-packing under full line pressure. Heavy deep packing nut gives proper application of pressure on gland.

**wedge**—Heavy, rugged wedge, slip-on type, is guided to proper setting by milled wide grooves which engage ribs cast in body. Wedge is reversible for longer life. When valve is wide open, wedge entirely clears line of flow for lowest possible pressure drop.

**stem**—Of high strength cold rolled steel or bronze rod stock. Inside screw construction. Stem rises as handle is turned for visual indication of position of wedge.

**corrosion resistant**—All iron and steel parts are Parkerized or Parcolac'd to impart corrosion resistance to both the interior and exterior of the valve.

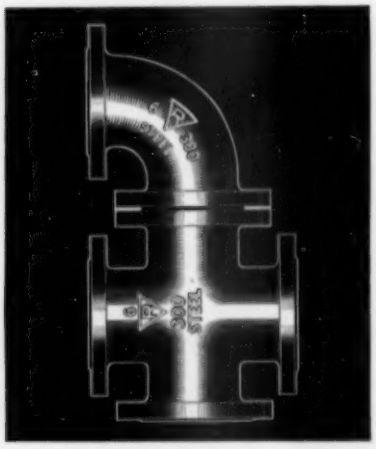
**Your R-P&C District Office or Distributor can give you complete information about this Fig. 522-C Clip Gate valve or any of the other valves in R-P&C's complete line—which includes bronze, iron, cast and forged steel, and bar stock valves. Call today or write for Catalog 9.**

# for EASIER CLEANING!

## FROM R-P&C's COMPLETE LINE

**Pressure sealed bonnet joint cast steel valves** are furnished in gate and globe valve styles in 900 lb., 1500 lb., and 2500 lb. pressure classes.

**Bar stock valves** are precision machined from highest quality bronze, carbon steel, or alloy steel bar stock. Working pressures for carbon steel range from 10,000 lbs. at 150°F to 475 lbs. at 1,000° F. Sizes from ⅛" to 1".



**Cast steel fittings,** ells, tees, laterals, crosses, reducers — screwed or flanged ends. Furnished in a wide variety of sizes up to 24", in pressure classes from 150 lbs. to 2500 lbs.

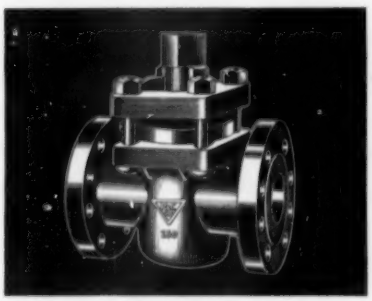
## THE SECRET OF R-P&C's BETTER VALUES— QUALITY CONTROL

• A vital component of each R-P&C Valve is an ingredient you can't see. This hidden ingredient insures that you get the trouble-free operation and longer life engineered into each R-P&C design.

This hidden ingredient is called "quality control." It is a philosophy that dominates every step of the manufacturing operations that produce each R-P&C Valve.

Castings for every R-P&C Valve are produced in our own foundries under careful metallurgical controls. Casting soundness is verified by special radiographic techniques using radium or radioactive isotopes. Dimensional accuracy of each valve part is checked by a variety of gauging methods, including some specially developed by R-P&C engineers.

Before it leaves the factory, the performance of each valve is proved by individual hydrostatic and other tests. These tests are normally conducted at pressures higher than those for which the valves are rated.



**Asbestos-packed cocks,** an R-P&C exclusive, are furnished in iron in sizes from ¼" to 6" with screwed or flanged ends.

**Fig. 212 screwed end bronze check valve** typifies R-P&C's complete check valve line — furnished in iron, bronze or cast steel in sizes ranging from ¼" to 24".

## WHICH OF THESE HELPFUL TECHNICAL AIDS DO YOU WANT?

R-P&C provides a wide variety of free technical aids to assist the buyer in valve selection, installation and operation. Among these are:

**Valve Selector Slide Rule.** Handy selector slide rule gives all dimensions for iron body valves, steel valves in 150, 300, 400, 600, 900 and 1500 lb. classes.

**How To Select Valves.** 17" by 11" wall chart lists principles to use in selecting valves for various applications . . . considers effects of fluids, temperatures, pressures, sizes, service requirements.

**How To Protect Your Valves.** 17" by 11" wall chart lists 22 installation and operation pointers to protect valves, get maximum life.

**How To Know Valves.** 17" x 11" wall chart graphically illustrates appearance, construction, operation, recommended applications for gate, globe and check valves, cocks.

***Any of these free technical aids furnished promptly on request***
***Write R-P&C Valve Division, American Chain & Cable, Reading, Pennsylvania***

ACCO

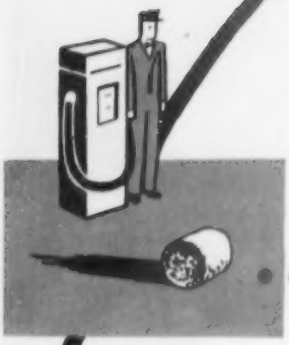
TRADE MARK

**R-P&C Valve Division**
**AMERICAN CHAIN & CABLE**

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

**R-P&C valves**

with ATLANTIC



# ...it's the catalyst that counts!

The Davison Chemical Corporation has teamed with The Atlantic Refining Company in the development of a catalyst for reforming straight run and cracked gasolines to a product of higher octane level. Among the important tasks delegated to Davison was the translation of this catalyst from laboratory to commercial production and at the same time impart optimum selectivity, stability, ruggedness and regenerability.

Today, Davison is producing Atlantic Platinum Reforming Catalyst on a commercial scale and shipments are being made at an increasing rate to licensees of the Atlantic Catforming Process. Davison has an outstanding record of this type of development in many fields of commercial catalyst production. If you have a catalyst problem, see your Davison Field Service Engineer or write.

Progress Through Chemistry

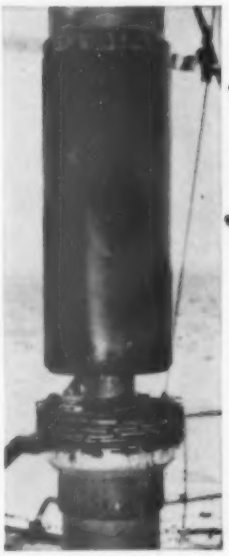
**DAVISON CHEMICAL COMPANY**

Division of W. R. Grace & Co.

BALTIMORE 3, MARYLAND

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, TRIPLE SUPERPHOSPHATE, PHOSPHATE ROCK, SILICA GELS AND SILICOFLUORIDES. SOLE PRODUCERS OF DAVCO GRANULATED FERTILIZERS

# NOW - only JOHNSTON provides this new, field-proven testing method! with BOB TAIL PACKER and HYDRAULIC TESTER



**THIS** . . . Actual photo of the new Bob Tail Packer coming out of the hole without any extrusion or flow of the rubber packing element!

**NOT THIS** . . . Typical example of the extrusion that occurs on conventional packers — now practically impossible with the new Bob Tail Packer!

## BOB TAIL PACKER

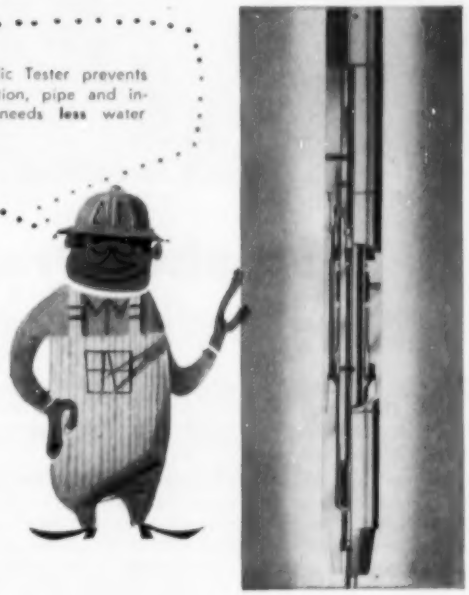
Absolutely Prevents Extrusion! You get the tightest seal it's possible to produce . . . a **perfect** seal. With the Bob Tail Packer there's **no** extrusion, **no** flow of the rubber packing element! Here's why the new Bob Tail Packer makes such a big difference:

★ **Pack-Off Is Up To 30% More Effective!** Metal petal cups at base of packer hold the rubber in the pack-off zone! Rubber **can't** flow or extrude down the lower packer assembly!

★ **Up to 3 Times MORE Clearance** when going in the hole. The Bob Tail utilizes entire volume of rubber in the pack-off zone. Loses none to extrusion—so a much smaller diameter is effectively used.

★ **Removes Easily From Packer Seat** after the test is completed, rubber is intact, thanks to the special design.

Type B Hydraulic Tester prevents shock to formation, pipe and instruments and needs **less** water cushion!



## TYPE B HYDRAULIC TESTER

**Prevents Shock To Test Zone** by releasing pressure **slowly** below the packer! The Type B Hydraulic Tester opens in stages during 2½ to 4 minutes . . . allows spudding through tight spots you may find in open or uncased hole!

**Positive Operation for Positive Interpretation!** The compact, self-contained Johnston Hydraulic Tester opens by applying drill pipe weight, closes by removing weight! Functions smoothly **every** time—reduces plugging and damage to wall of hole.

**See The Difference** this super-accurate testing team can make for you! Remember, it's always Johnston **first**—in speedy service, in new developments for **accurate** testing!

# JOHNSTON TESTERS

## first in drill stem testing

**HOUSTON, TEXAS**

LOS ANGELES, CALIF • CALGARY, CAN.

C0542

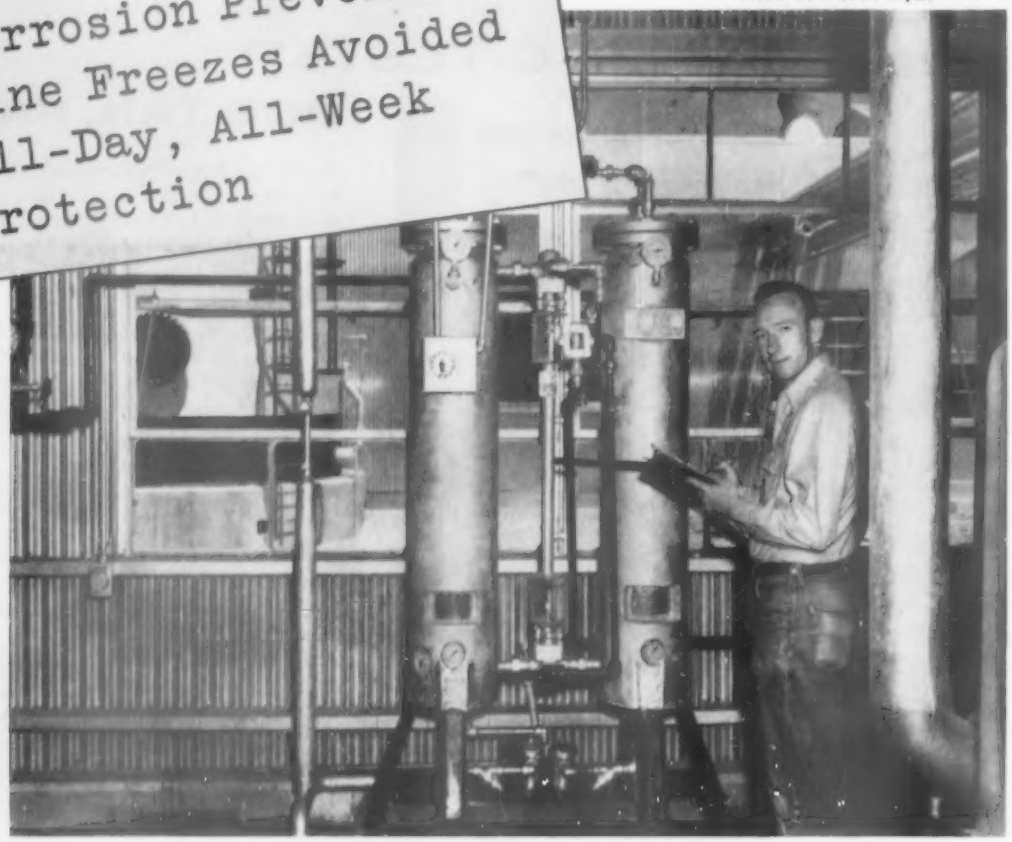
FORMATION AND CASING TESTING — JOHNSTON

Case No. 108

Seaboard Oil Company Reports:

- Corrosion Prevented
- Line Freezes Avoided
- All-Day, All-Week Protection

Jerry Rea, plant worker, checks on the trouble-free operation of twin towers comprising Kemp Model 50-S Oriad Dryer.



# Sulphur Producer Gets Automatic Drying of Compressed Air with Kemp

During their processing of sulphur and sweetening of natural gas, the Powell, Wyoming, plant of Seaboard Oil Company of Delaware needs large quantities of dried, compressed air to operate complex control instruments.

When their Silvertip Field plant was opened, the operators turned to Kemp to provide this dried air, installing a Model 50-S Kemp Dryer. The machine operates on a manual switching and automatic timing device. Imbedded steam coils reactivate the towers . . . permitting 25 cfm capacity at an exit pressure of 50 psi. The installation is operating 24 hours a day on a seven-day week — preventing corrosion and avoiding costly delays caused by line freezes in the plant.

If drying air or other gases is a problem in your operation, it will pay you to discuss your problems with a Kemp Engineer. He can recommend specific equipment to handle your specific problem . . . and give you the benefits of *every* Kemp installation—simplicity of operation and maintenance, low installation cost and minimum maintenance expense. A Kemp Engineer is ready to discuss your needs—without obligation.

*For detailed, technical information, ask for Bulletin No. D-29. Write to:*
**C. M. KEMP MFG. CO., 405 E. Oliver Street, Baltimore 2, Maryland**

**KEMP OF BALTIMORE**

**ADSORPTIVE DRYERS**

ATMOSPHERE & INERT GAS GENERATORS
SINGEING EQUIPMENT • IMMERSION MELTING POTS
CARBURETORS • BURNERS • FIRE CHECKS

BEAIRD-INGERSOLL-RAND

*Packaged Compressor Plant*

Lowest Cost Per Horsepower Installed

*This packaged compressor plant is complete with Ingersoll-Rand gas engine driven compressor, Young radiator and all necessary equipment and controls. Sizes from 110 h.p. to 550 h.p.*

NATURAL GAS & OIL COMPANY has a compressor station in Sligo Field, Louisiana, which is planned for maximum use of compressor horsepower throughout the life of the wells it serves. To boost gas from low pressure wells into gathering lines the company recently installed one single-stage 550 horsepower Beaird-Ingersoll-Rand packaged compressor plant. In the future, as well head pressures fall, a second 550 horsepower unit may be installed in space already provided in the same building. Later, both compressor plants may be easily converted to two-stage units. And finally, as the well is nearing depletion, one of the compressor plants may be transferred as a complete package to another site, leaving the remaining plant to complete production.

*Let us show you the economy of using Beaird-Ingersoll-Rand packaged compressor plants for gas production.*

*Boosts field gas —*

## HOW ONE PRODUCER PLANNED A FLEXIBLE COMPRESSOR STATION

THE J. B. BEAIRD COMPANY, INC.

*Shreveport, Louisiana*

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE GAS STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS

**BEAIRD** Pressure Storage Tanks

Engineered For Safe Storage

# *Now ALL Beaird Tanks are X-rayed*

You know the advantage of having all shell seams on pressure tanks X-rayed. And now that is standard practice on all our large LP-Gas and anhydrous ammonia tanks — not just spot X-raying — but complete X-raying of entire shell seams. For example, on each 30,000-gallon tank, over 200 separate films are exposed, developed and individually inspected. With these films, our inspectors can literally see through every inch of seam on the entire shell. They know the welding is sound.

That is why we have gone to the expense of installing the most modern radiographic equipment — to assure you that the Beaird tanks you receive are engineered and manufactured for safe storage.

*Let us quote you on your pressure storage requirements.*

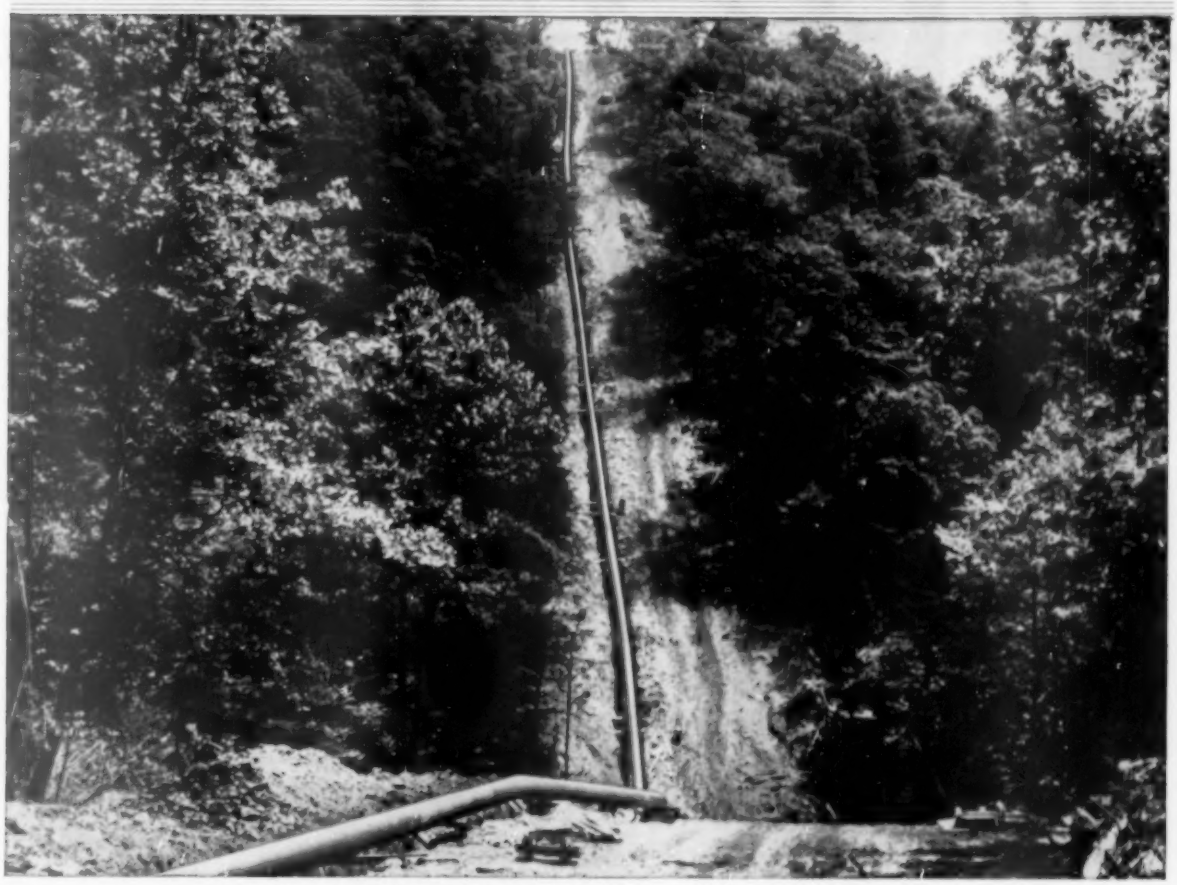
**THE J. B. BEAIRD COMPANY, INC.**

**SHREVEPORT, LOUISIANA**

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

# PIPE LINE PROGRESS



26-inch line ready to be lowered in on Cobb-Rockville section of Columbia Gas Systems line.

## Columbia Gas Systems Looping "Toughest Inch" with A. O. SMITH 26-INCH LINE PIPE

**In the memory** of the men who built it, the 262-mile Cobb-Rockville Line, now carrying natural gas from Charleston, West Virginia, to Washington, D.C., is still the "toughest inch." It was completed in December of 1949 through some of the roughest terrain for laying pipe ever encountered.

**The "toughest inch"** consists mainly of A. O. Smith internally expanded, 26-inch welded steel line pipe.

**A portion of this line** is now being looped with additional A. O. Smith 26-inch line pipe . . . evidence of satisfaction in our large-diameter welded pipe.

**Again** the pipe liners are conquering the "roller coaster" grades, rocky terrain, violent streams and stubborn tangle of brush to assure adequate gas supply at the Rockville terminal of the "toughest inch."

*A. O. Smith Line Pipe is available in a complete range of sizes and wall thicknesses, from 8⅝-in. to 36-in. diameters.*

The A.O. Smith Casing Mill is operating at capacity to supply vitally needed casing for the Oil and Gas Industry.

*Through research* ...a better way

**A.O.Smith**

CORPORATION

TUBULAR PRODUCTS DIVISION

Milwaukee 1, Wisconsin

Chicago 4 • Dallas 2 • Houston 2 • Los Angeles 22 • Midland 5, Texas • New Orleans 12 • New York 17 • Pittsburgh 19 San Francisco 4 • Seattle 1 • Tulsa 3 • Washington 6, D.C.

*International Division: Milwaukee 1*



(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

# FIRE!

## PUT IT OUT IN SECONDS

### *with a Kidde Portable extinguisher*

Unless you get the jump on fire the minute it starts, you stand a good chance of kissing your business good-bye.

That's why it's so important to have a Kidde portable extinguisher near *every* fire hazard in your plant.

Protect motors, electrical equipment, flammable liquids and machinery with Kidde portables. Then, when fire strikes, you're ready for it.

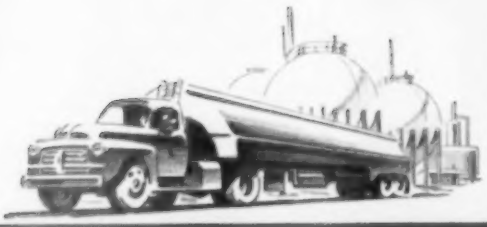
Just grab a Kidde $CO_2$ or dry chemical portable, aim the horn, pull the trigger, and—Whoosh! No more fire!

Your *next* fire could be your *last*... Contact Kidde today!

**Kidde** (K Kidde)

*The words 'Kidde', 'Lux', 'Lux-O-Matic', 'Fyre-Freez' and the Kidde seal are trademarks of Walter Kidde & Company, Inc.*

**Walter Kidde & Company, Inc.**
**654 Main Street, Belleville 9, N. J.**
**Walter Kidde & Company of Canada, Ltd., Montreal—Toronto**



# Eaton 2-Speed Axles Give Truckers all this..

**Speed When Wanted**

**Power When Needed**

**Quicker Trips**

**Maximum Pay-Load**

**More Dollars Earned**

**Reduced Driver Fatigue**

**Lower Operating Cost**

**Reduced Engine Wear**

**Minimum Shop Time**

**Low Maintenance Cost**

**Longer Truck Life**

**Higher Trade-In Value**

**Ask Your Truck Dealer for a Demonstration**

**More than Two Million Eaton Axles in Trucks Today!**

# EATON

AXLE DIVISION

MANUFACTURING COMPANY

CLEVELAND, OHIO

**PRODUCTS:** Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

# We tear truck axles to

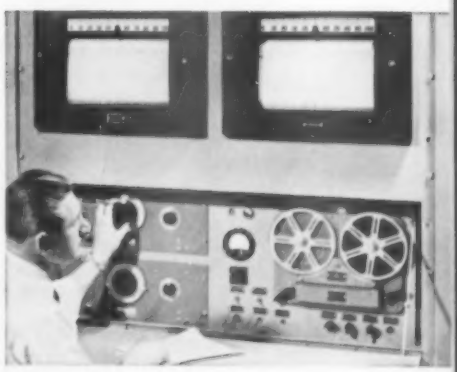
## *in the new Timken-Detroit indoor proving ground ...and only Timken has it!*

**We smash, twist, jerk and over-load them. Match every imaginable hauling situation. Then add a few ruinous tricks of our own.**

**It's done on purpose.** So we can tell you in advance that a Timken-Detroit axle can take a more brutal beating on the job it was designed for than any other axle made.

To prove it, we condensed a multi-thousand acre proving ground into one room. In it, our engineers can apply 50 years of experience in building axles for trucks, buses and trailers. Here axles and gearing are subjected *indoors* to any possible *outdoor* hauling condition. Axle performance is measured and analyzed under absolute scientific control.

As a result: you enjoy longer axle life; less maintenance, repairs and down-time; lower operating costs; fatter profits. No wonder Timken-Detroit axles are the choice of manufacturers and owners everywhere!



**This is our "truck driver,"** he works in the "Torture Chamber." Above him are graphs showing speed and torque performance under any operating condition he chooses . . . soft ground at full load . . . mountains . . . express highways or side roads. With special dials, recorders and electronic devices, he actually *drives* the axle with scientific accuracy from his chair!

**How TDA proves axle quality in this "Torture Chamber."**

We take one of our axles and put it on the "block". . . then duplicate the roughest hauling condition, hour after hour, day after day . . . such as simulating 500,000 miles of toughest driving in just a few days. Or we "dream up" a test like going up hill with a full load at 45 m.p.h. from California to New York—*non-stop*. There is no other axle-testing like it in the world!

**You haul heavy machinery.** And you're sure with Timken-Detroit axle shafts. Proved capable of being twisted 14°—forward and backward—36 times a minute, 24 hours a day, for days on end. Only Timken-Detroit "Torture-Tested" axles can take this brutal treatment—assure you top performance—make you more money per load.

# pieces

**TIMKEN** *Detroit* **AXLES**

TIMKEN-DETROIT AXLE DIVISION
ROCKWELL SPRING AND AXLE COMPANY
DETROIT 32, MICHIGAN

*The Accepted* TDA *Standard*
TRADE MARK REGISTERED

**"TORTURE-TESTED"**
***to Save Money on the Job***

WORLD'S LARGEST MANUFACTURERS OF
AXLES FOR TRUCKS, BUSES AND TRAILERS

**Timken-Detroit Front Axles**

Here is easy, positive steering control. A little man can handle a large rig with TDA front axles as easily as a big 210-pound, six-footer, at fast or slow speeds . . . on smooth o rough roads. No wheel kickback. Tractor hook-ups have smallest possible turning radius – greatest maneuverability.

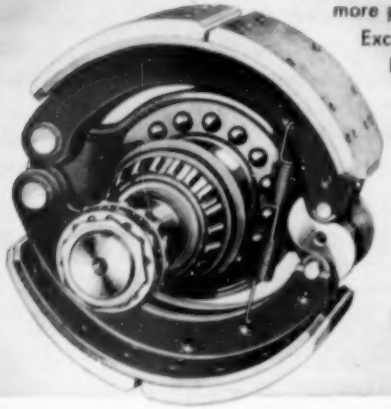
**Timken-Detroit Hypoid Gearing**

Hypoid gearing for truck axles was pioneered by Timken-Detroit. And only Timken-Detroit has Hypoid gearing in a complete "family" of 7 basic axle capacities—in the entire range of medium and heavy-duty requirements. This advanced-related design incorporates the same features of construction and interchangeability in a choice of 3 types of Hypoid final drives using the same axle shafts and housing—single-speed; single-speed double-reduction; and two-speed double-reduction units.

**Timken-Detroit Tubular Trailer Axles**

Famous for their light weight. Produced in the largest, most modern axle plant in the world. Lightweight Fabricated Brake Shoes with Econoliners for greater wear, longer service. Alloy steel spindles electrically welded to tubular housing—with welding guaranteed for the life of the axle. Lightweight Nylon Bushings in Brake Camshaft Assemblies.

**New TDA brake shoes save up to 40 lbs. per axle**

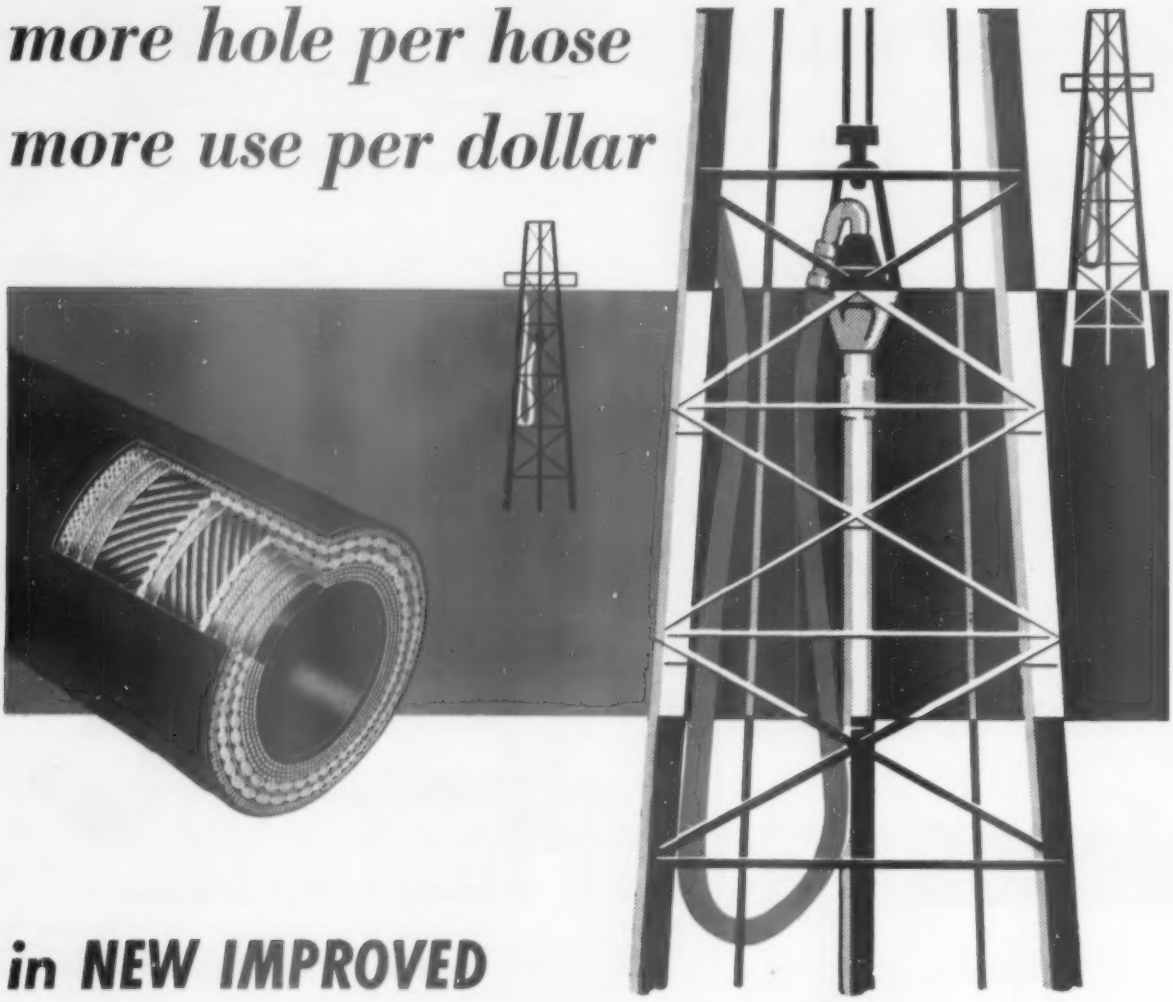


- Lightweight, pressed steel construction to give you more payload plus long wear and safety.
- Exclusive ¾" TDA "Econoliner" brake liners held rigidly by 12 deep-set rivets per block—*not bolts*. Liners are thickest at center where greatest wear occurs—taper down at ends. Result—longer wear, greater stopping ability.
- New cam roller mountings never seize or brinnel.
- Light nylon camshaft bearings wear up to 4 times as long!

It's America's new brake shoe!

Plants at: Detroit, Michigan • Oshkosh, Wisconsin • Utica, New York • Ashtabula, Kenton and Newark, Ohio • New Castle, Pennsylvania

# *more hole per hose*
# *more use per dollar*



## *in NEW IMPROVED*
## *RAY-MAN CBL ROTARY HOSE*

Valuable features give you "More Use per Dollar" in the new, improved Ray-Man CBL Rotary Hose. First is the special cable wire construction that permits more flexibility with a higher safety factor. It has higher resistance to accidental crushing. Easier to handle properly in transport and make-up on the rig. Streamlined, built-in coupling with blow-out proof "Lip-Lok" Seal tightens under high pressure. This safety feature alone justifies your investment in Ray-Man CBL, but its many other features make it easily the lowest cost rotary hose in footage drilled.

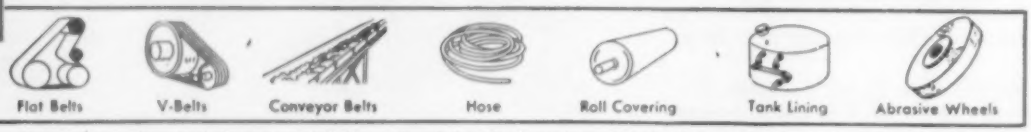
**DISTRIBUTED BY NATIONAL SUPPLY COMPANY IN ALL PRINCIPAL OIL FIELDS**

For information on other R/M rubber products; oil-loading, LPG and other hose, transmission, and V-belts, molded products, write for Catalog 6903.

R/M

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

**RAYBESTOS-MANHATTAN, INC.**




Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

# *FULL VISION means you'll Move More with a* MICHIGAN

Step into a MICHIGAN* cab, and sit in the operator's comfortable seat. Notice how easy it is to follow every move on the job. 3604 square inches of glass!—see what excellent vision is provided, in all directions and overhead.

Here, indeed, is a masterpiece of smart modern design: a truly functional cab—fully ventilated, quiet; a comfortable cab designed to make the operator's job as easy as possible. Look, also, at the outside of the cab; at the adjustable louvers on both sides for good ventilation; the sliding rear doors that make it easy to get at the engine; the rear window to complete the full-vision facility.

For an easy point-for-point comparison of the MICHIGAN with other machines, send for the MICHIGAN Fact Folio: contains full information, including an interesting book "More Yardage Through Air Power." The coupon gets prompt action.

**A Trademark of Clark Equipment Company*

**CLARK EQUIPMENT**

**CLARK EQUIPMENT COMPANY**
**Construction Machinery Division**
**448 Second Street, Benton Harbor, Michigan**

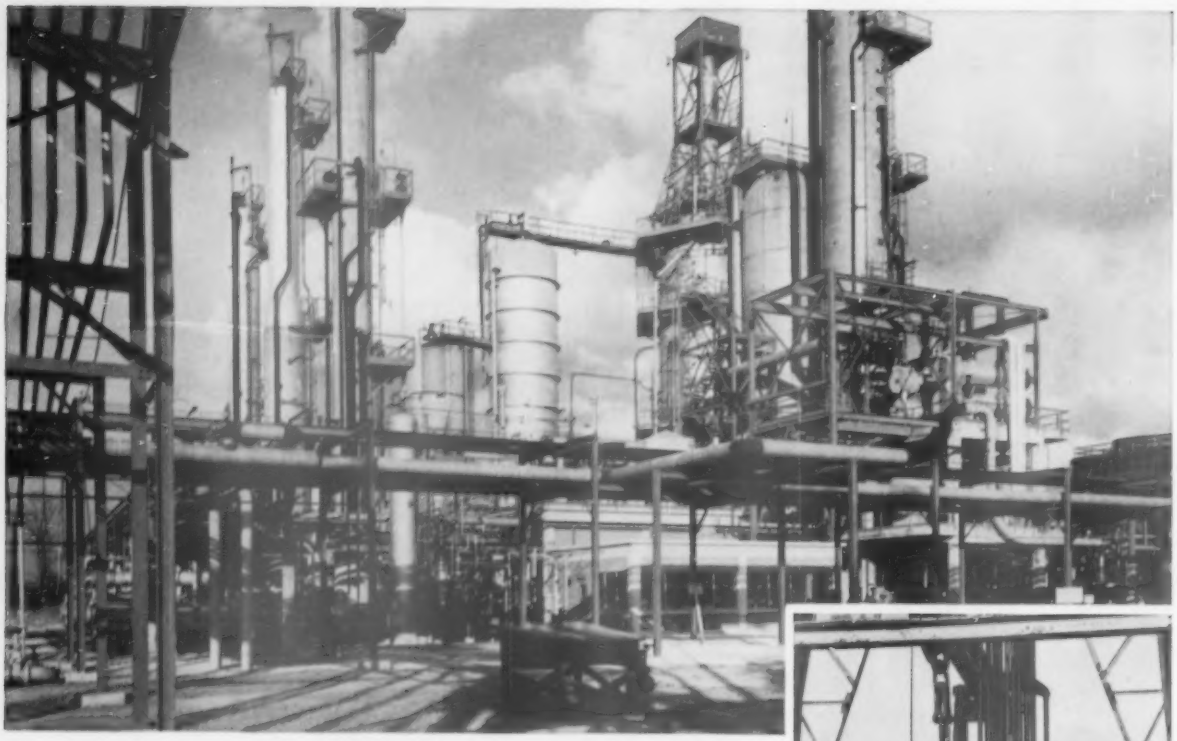
Please send the MICHIGAN "24" Fact Folio

Name_____ Title_____

Firm_____

Address_____

City_____ County_____ State_____



Petroleum refining equipment similar to this is rising now from the prairie near Mandan, North Dakota. There, Standard Oil is building a new refinery capable of processing 30,000 barrels of crude oil a day. It will provide the first major outlet for Williston Basin production.

# OIL is making a prairie plant grow

Under the ground on which Williston Basin residents walk, build homes and grow crops lies a fortune in oil.

But oil underground is no one's wealth unless it can be brought to the surface, refined and marketed. And without facilities to handle it after it reaches the surface, the oil must remain underground.

Building these facilities is a costly job.

Standard Oil is now speeding construction of North Dakota's first major refinery—at Mandan. The Service Pipe Line Company, a Standard Oil subsidiary, built the state's first crude oil gathering system and has built a trunk line to connect with the refinery. A 200-mile pipeline, through which products of the new refinery will flow eastward from Mandan to Moorhead, Minnesota, has also been completed.

The Mandan refinery and the new pipelines will bring many long-range benefits with them. They will help develop the wealth that will mean better schools, better roads and a multitude of other benefits for all in this area.

They will mean more jobs—not alone in the oil industry, but in construction, supply and the merchandising and service fields. And, because of a greater volume and a greater diversity of business, the region as a whole will be even more prosperous.

The multi-million dollar investment by Standard Oil—this willingness to take a risk in hope of earning a profit—means that residents of North Dakota will be able to enjoy more of their underground riches at a time not too far distant.

**Standard Oil Company** (INDIANA)

**IT WON'T BE LONG** until drilling scenes like this will be a "dream come true" on many more North Dakota farms. When facilities for handling crude oil are scarce, drilling and pumping are held back, and this new "crop," deep underground, can not be harvested.

**IT WON'T BE LONG** until Standard Oil agents, like Dan Dowhower of Inkster, N. D., will be delivering "home grown" petroleum products. The Mandan refinery, scheduled to be operating before the end of this year, will refine crude oil produced in North Dakota.

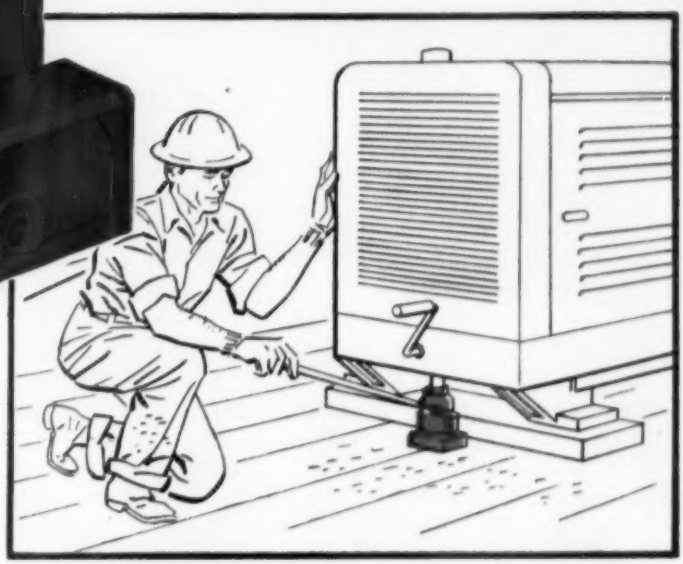
# This modern jack can lift heavier loads with less effort!

This precision built jack requires much less effort to operate than mechanical type jacks because it utilizes the hydraulic principle—a pump does the work.

Duff-Norton Hy-Power Hydraulic Jacks, because of this ease of operation, are finding more widespread use in the oil fields for all kinds of heavy lifting and pushing jobs. They are standard equipment on many rig builders' trucks and on drilling rigs.

The hydraulic jack illustrated (No. 25H9) can lift 25 tons up to 6 inches. It is only 9⅜ inches high when closed and weighs only 38 lbs. There are nine other models of Duff-Norton Hydraulic Jacks with capacities from 3 to 50 tons. All models can be equipped with gauges calibrated to show exact weight of load being lifted.

See these time and energy saving hydraulic jacks at your favorite supply store or write the world's oldest and largest manufacturer of lifting jacks for complete specifications. Ask for Hy-Power Hydraulic Jack Bulletin AD16-B, The Duff-Norton Manufacturing Co., P.O. Box 1889, Pittsburgh 30, Pa. Canadian plant —Toronto 6, Ontario.



# DUFF-NORTON *Jacks*

*"Giving Industry A Lift Since 1883"*

# CALIFORNIA WELL

## *a Continuous Producer since* 1876

Up in Pico Canyon, near Newhall, is California's oldest commercial oil well. It was completed September 26, 1876, and has been in continuous production ever since.

Brought in at a depth of 300 ft, this venerable well was later deepened to 600 ft and again to 1050, at which point mechanical pumping had to be installed. At a celebration held in 1953, the well was honored by the Petroleum Production Pioneers, and a monument and plaque now commemorate its colorful career.

Today the old-timer is producing from a depth exceeding 1200 ft. The oil, 37.2 crude, is brought to the surface by a Bethlehem 25D pumping unit, which offers a striking contrast between the old and the new. Efficient, powerful, smooth, this unit is indeed a far cry from the obsolete device that first pumped the well many years ago.

Bethlehem pumpers are used all over the world, in practically every major production field. They are made in a wide range of sizes and are furnished with any desired type of prime mover. Whether your oil lies shallow or deep, a Bethlehem unit will bring it to the surface with minimum effort and at minimum cost. Check with our nearest office or store for complete information.

**Owned by Standard Oil Company of California, this historic well has been a source of crude for more than three-quarters of a century. *Background:* Monument honoring the well's long production record.**

**In addition to pumping units and all items of drilling equipment, Bethlehem offers Beth-Co-Weld line pipe, Purple Strand wire rope, and a complete variety of sucker rods, fasteners, etc. Ask for these well-known products when equipping your oil-country installations.**

BETHLEHEM STEEL

**BETHLEHEM SUPPLY COMPANY**

*General Offices:* 21 E. Second St., Tulsa, Okla.
*West Coast Headquarters:* Los Angeles, Calif.
*Export Distributor:* Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

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Bulletin C-95 illustrates and describes new internal construction features which give higher capacity and close regulation. Write for your copy today.

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**MARSHALLTOWN, IOWA**

LEADS THE INDUSTRY IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

# New Le Roi H844

## Service

— as near as your telephone

Complete stock of parts
Skilled mechanics on 24-hour call
Unexcelled overhaul facilities

## OILFIELD SALES-SERVICE NETWORK

**Oklahoma**
Le Roi Company Branch — Tulsa
Carson Machine & Supply Co. — Oklahoma City

**East & South Texas, Gulf Coast**
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, New Orleans, Louisiana.

**North & West Texas, New Mexico**
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

**Kansas**
Carson Machine and Supply Co.—Great Bend

**Rocky Mountain Area**
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

**Mississippi, Arkansas and Northern Louisiana**
Ingersoll Corporation — Shreveport, Louisiana, El Dorado, Arkansas and Clarksdale, Jackson, Mississippi.

**West Coast**
Le Roi Engine Sales Co. — Long Beach, California

**Appalachian Area**
P. C. McKenzie Co., Pittsburgh, Bradford.

**Canada**
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

# 225-hp V-8 Engine

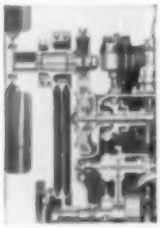
***New performance . . . New dependability . . . New over-all economy*** — for slim-hole drilling rigs, workover rigs, well-servicing equipment, booster compressor, pumping and pipeline applications

**Extra-heavy counterbalanced crankshaft** is dynamically balanced to eliminate harmful vibration. Withstands the high explosive and torsional forces of high-compression, high-speed operation.

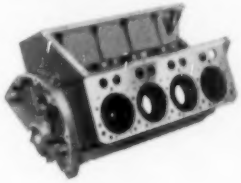
**Wet-type cylinder sleeves** help keep maintenance costs low. Liners can be replaced at a fraction of the cost of reboring the block.

**Cam-ground aluminum pistons** have full-floating piston pins. They minimize vibration, improve efficiency and maintain correct cylinder-wall contact under all conditions.

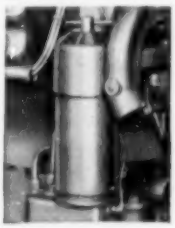
**Gear-driven water pump** provides dependable circulation. Pump-shaft is pressure-lubricated from engine oil supply — no belt loads to cause premature wear.



**Box-like crankcase** provides extra rigidity to withstand the strains and stresses of rough handling. Also eliminates the need for troublesome seals.



**Full-pressure oiling system** provides lubrication under pressure to all vital engine parts. Full-flow filter cleans all of the oil.



## *Today's most advanced, medium-speed, lightweight engine — unbeatable power for all oilfield applications*

Here's the big brother to Le Roi's H540, an old oilfield favorite. It's another step forward for Le Roi — another step in Le Roi's never-ending program of designing and building to keep pace with new oilfield demands for more power, more compactness, greater dependability, greater accessibility, greater economy under continuous load.

This new Le Roi has an 844-cubic inch displacement. Its V-8, valve-in-head design offers several advantages: (1) It provides a smooth flow of power throughout a wide range of speeds up to 2,000 rpm. (2) It reduces idle time and labor costs by making periodic maintenance procedure simpler — because of accessibility of accessories. (3) It is designed for compactness and produces 225-hp—that's a lot of power in a small package.

You can equip the H844 to burn natural gas, butane — propane, or gasoline. Either way, you enjoy trouble-free performance and low operating costs. Ask your rig manufacturer, supply house, or Le Roi distributor to show you all the reasons why. See him soon.

**LE ROI COMPANY**

A Subsidiary of Westinghouse Air Brake Co.

MILWAUKEE 14, WISCONSIN

*Plants:* Milwaukee • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Mich.

*Oilfield Headquarters:* Tulsa, Oklahoma

P-127

# Equipment with *Engineering* Service

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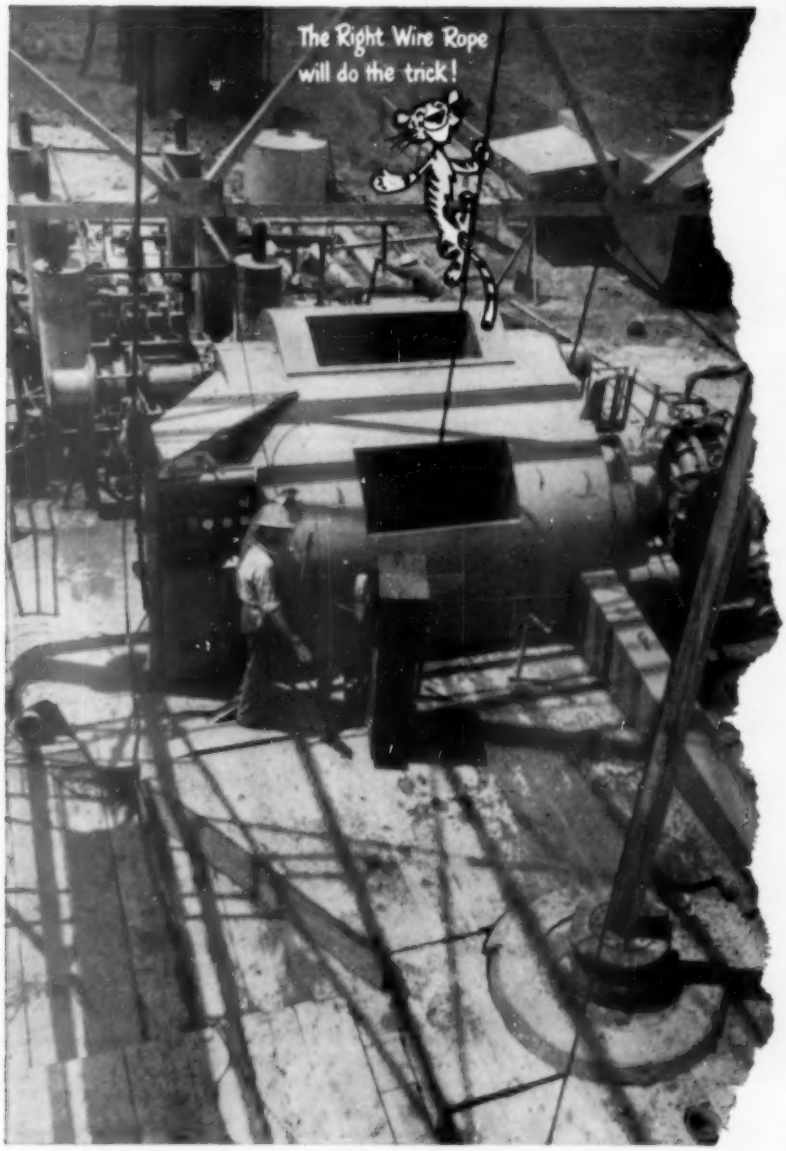
**MAINTENANCE *Engineering* CORPORATION**

P. O. BOX 2637

3711 CLINTON DRIVE
HOUSTON, TEXAS

# Fast spooling, long life, good kink resistance with Tiger Brand Excellay Drilling Line




ROTARY drilling or casing lines must spool smoothly at high speed; they must hold up under severe abrasive wear and frequent bending. That's why we recommend Tiger Brand *Excellay Preformed* Rope for rotary drilling lines.

With Excellay Preforming, every wire in the line is preshaped to the form it must assume in the finished rope. As a result, there are no internal stresses in the wires to cause premature failure, and the line is free from twisting tendencies—it is less likely to kink than a non-preformed line. You'll find that a Tiger Brand *Excellay Preformed* Line stays in service longer and works better than any non-preformed line. Ask for it next time you buy drilling line.

For a complete list of Tiger Brand Ropes for the oil fields and for valuable tips on the use and care of wire line, send the coupon.

**FREE BOOKLET**

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Please send me your information-packed booklet "Wire Lines for Oil, Gas, and Water Wells." I understand there's no charge.

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**USS AMERICAN TIGER BRAND WIRE ROPE**

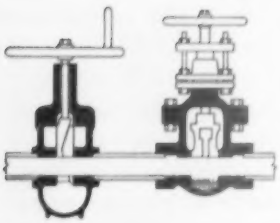
*Excellay Preformed*

USS

UNITED STATES STEEL

# 12 Reasons

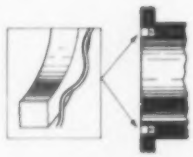
## why WKM Valves are your best buy for any service



**1 Through Conduit Design** . . . prevents foreign matter from jamming valve, provides smooth, turbulence-free flow, eliminates conventional pressure drop.

**2 Renewable Seats** . . . one- and two-piece seat and skirt assemblies are easily renewable, even while the valve is on the line.

**3 Chrome Plated Gates** . . . W-K-M gates are ground and chrome-plated for a smooth, hard finish. Gates with inlaid seats or made of special alloys are available.

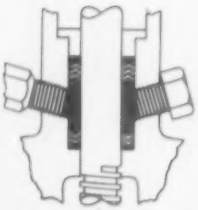


**4 Spring-Loaded Seal & Wiper Rings** . . . bear against the gate and segment at both seats wiping the gate surfaces clean at each operation and also serve to prevent loss of lubricant in operation.

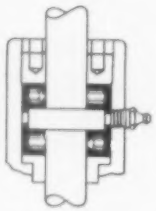
**5 Superfinished Stems** . . . with ground threads for easy handwheel operation even under high packing pressure.

**6 Parallel Expanding Gates** . . . are the basic secret of W-K-M Valves' success. This design, developed by W-K-M, makes possible full conduit flow, positive shut off on both sides and most of the other advantages shown on this page.

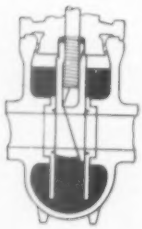
**7 Pressure Seal Bonnet** . . . eliminates bonnet flanges and studs, self-adjusts to temperature changes and seals tighter as the pressure goes up.



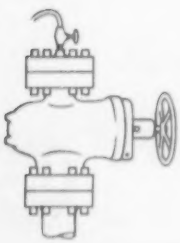
**8 Combination Plastic and Chevron Packing** . . . requires no gland or follower and keeps the packing within the stem enclosure free from dirt and contamination.



**9 Double Row Thrust Bearings** . . . take opening and closing thrust thus contributing to the easy opening and closing of W-K-M Valves.



**10 Automatic Lubrication** . . . is provided by filling body cavity with grease. Often this amount of grease is a lifetime supply.



**11 Careful Testing** . . . in the shop assures perfect performance in the field. Standard A.P.I. test procedure is used.

**12 Easy Field Repair** . . . while on the line. The entire valve may be overhauled while on the line with pressure off. Stems or bonnets may be replaced while valve is under pressure, if necessary.

No other standard valve offers so many features so important to trouble-free operation. If you need special-service valves, this basic valve is offered plus added features such as teflon seats, super-fast operators and special trim for any service.

To be sure of the very best in valve performance, order W-K-M Valves for every purpose.

W-K-M Valves

**W-K-M COMPANY**

P. O. Box 2117, Houston 1, Texas
Los Angeles, California
Export Office: 30 Rockefeller Plaza, New York, N. Y.

# "No repair expense"

## Says:

**Means less down time with MURPHY DIESELS**

MASTERS DRILLING COMPANY

MAILING ADDRESS P. O. BOX 1590
BAKERSFIELD, CALIFORNIA

January 21, 1954

Glenn Rose Engine Service
502 Real Road
Bakersfield, California

Gentlemen:

Our two Murphy Diesel Models 222's driving a D-300 Emsco 7 1/2 x 14 pump at 70 strokes a minute are now over a year old, with no repair expense and really have a surplus of power. We go to the bottom with out changing liners.

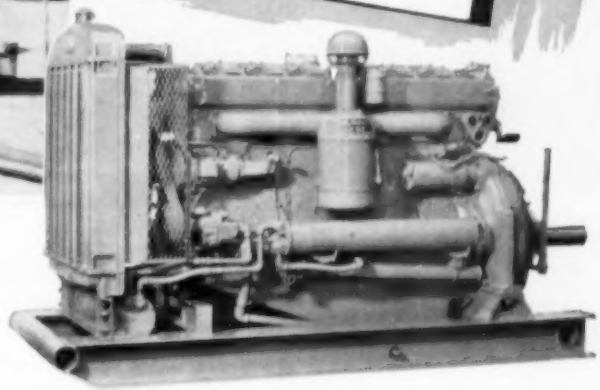
The engines are not fully loaded under these extreme conditions and do not loose any strokes. Our fuel economy was one of the first things we observed about these engines. They seem to have been designed for rugged oil field use.

I do not hasitate to recommend Murphy Diesels to my friends in the oil fields.

Yours truly,

MASTERS DRILLING COMPANY

By J. J. Masters



Murphy Diesel owners like Mr. Masters are the best judges of Murphy Diesel performance. Check the opinions of Murphy owners in your area and then ask your Murphy Diesel Dealer to show you what a Murphy will do for you. It could be the first step toward lower cost drilling for you.

**MURPHY DIESEL COMPANY**
**5305 W. Burnham St., Milwaukee 14, Wisconsin**
*FACTORY BRANCH*—Sales, Parts and Service:
113-117 South Elwood Street, Tulsa, Oklahoma

**Murphy Diesel engines and power units, 90 to 260 H.P. Dual-fuel engines, 135 to 215 H.P. Generator Sets, 60 to 154 K.W.**

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MURPHY DIESEL

***SEE YOUR MURPHY DIESEL DEALER, TODAY—***

ALBUQUERQUE, NEW MEXICO, Lively Equipment Company; BUTTE, MONTANA, Hall-Perry Machinery Company; CORPUS CHRISTI, TEXAS, Houston Engine & Pump Company; DALLAS, TEXAS, Conley-Lott-Nichols Machinery Co.; DENVER, COLORADO, Power Equipment Company; EDMONTON, ALBERTA, CANADA, Northern Engine & Equipment Co., Ltd.; GREAT BEND, KANSAS, Manufacturers Dist. Co.; GREAT FALLS, MONTANA, Hall-Perry Machinery Company; HOUSTON, TEXAS, Houston Engine & Pump Co., Inc.; JACKSON, MICHIGAN, Utility & Industrial Supply Co.; LOS ANGELES, CALIFORNIA, Industrial Engine Service; LUBBOCK, TEXAS, Conley-Lott-Nichols Machinery Co.; SAN ANTONIO, TEXAS, The Roy Klossner Company; BAKERSFIELD, CALIFORNIA, Glenn Rose Engine Service; ODESSA, TEXAS, Conley-Lott-Nichols Machinery Co.; LONGVIEW, TEXAS, Nichols Machinery Co. TULSA, OKLAHOMA, SALES, PARTS AND SERVICE.

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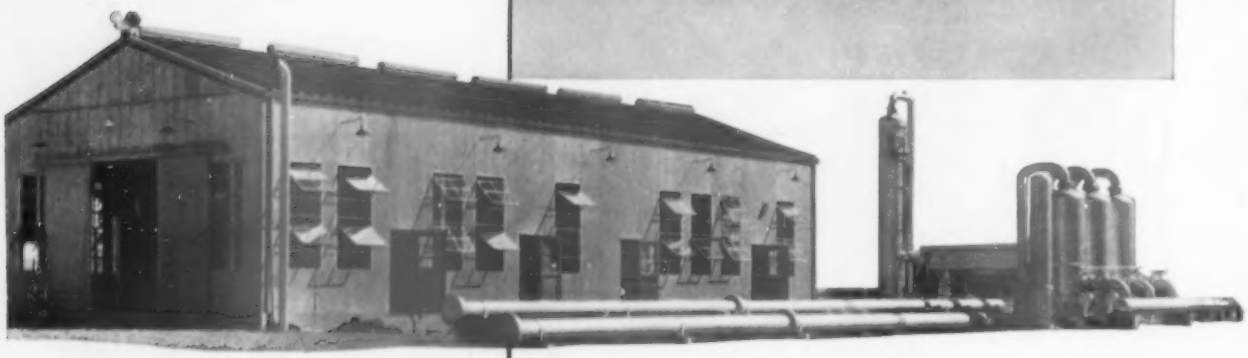
**UNMATCHED for Economy, Utility, Flexibility, Attractiveness!**



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**PARKERSBURG**
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The Parkersburg Rig & Reel Co. Parkersburg, West Virginia
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YOUR DRILLING RIG IS MORE EFFICIENT . . . equipped with dependable Fawick Airflex Clutch Elements. Simplicity of design, installation and operation mean unmatched service and long maintenance-free life. Torque load is carried through the rubber-and-cord actuating tube providing a "cushion" action which dampens the effects of vibration and shock loads. Write for Bulletin 400-A describing engine clutch and clutch coupling applications.

Another quality oil field product distributed exclusively by . . .

MID-CONTINENT Supply Company

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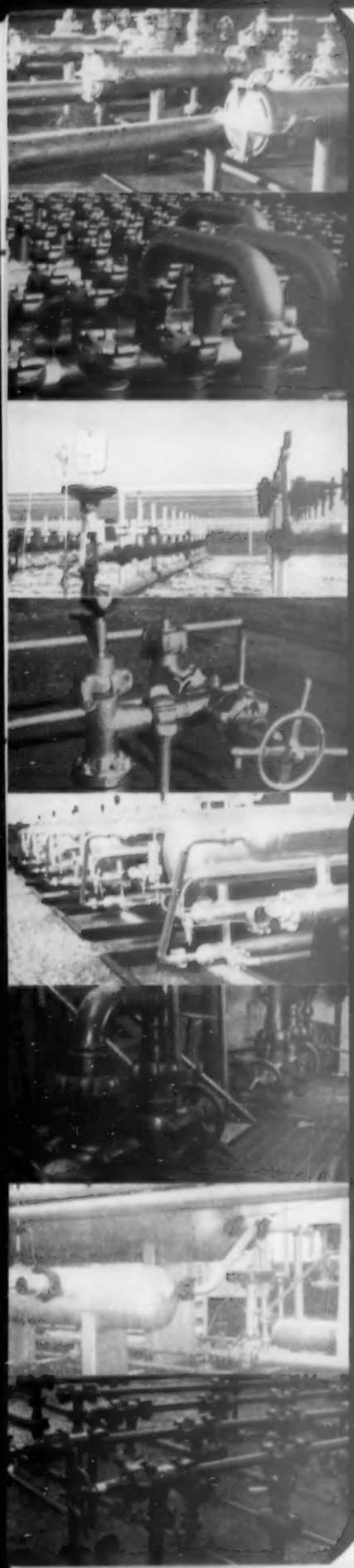
THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY



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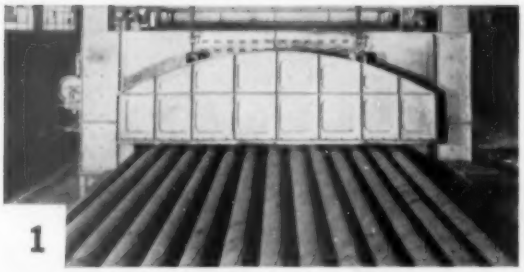
Distinctive features: **Lighter but stronger**—its unique design results in minimum bulk and weight yet places more metal in shear to provide greater strength. **One bolt**—simplifies assembly and disassembly and serves only to draw tapered interlocking shelves together, carrying none of the load of the coupling itself. **Adaptability**—its design readily permits adapting it to numerous fittings, as well as pipe couplings. **Interchangeability**—any part for a given size and type coupling or fitting is interchangeable, permitting minimum warehouse stocks of UNIBOLT products and replacement parts. **Broad field of application**—ALL UNIBOLT products utilize the same basic mechanical design, only the seal rings, or gaskets, differ with the class of service.

**THORNHILL CRAVER CO.**
P. O. BOX 1184 HOUSTON, TEXAS

# Here's why oil producers rely on
# REPUBLIC ELECTRIC WELD CASING AND TUBING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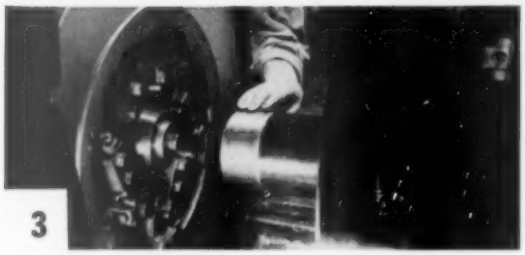
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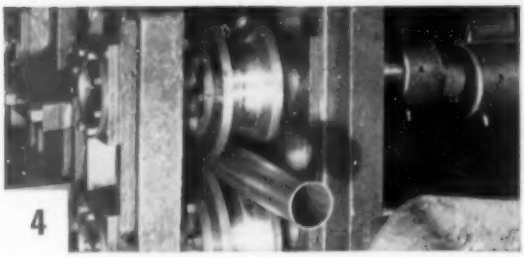

4

Actually, it can be summed up in two words—*dependable performance.*

Oil producers can't afford to make purchasing errors. Few people buy more carefully—or wisely. So naturally, we at Republic are extremely proud of our Electric Weld Casing and Tubing. It must be good. For the past 25 years oil producers have installed literally millions upon millions of feet all over the world.

Why? Here are four important reasons:

**1** **Pipe is normalized for uniform strength.** This produces homogeneous grain structure, and ductility. Casing is then cold sized to increase high yield strength, thus providing extra resistance to collapse.

**2** **Rigid tests safeguard quality.** Each length is carefully checked for uniform wall thickness and roundness, uniform strength and straightness. Both inside and outside surfaces receive visual inspection, and each length is subjected to hydrostatic pressure tests in accordance with Standard A.P.I.5A.

**3** **Rugged threads resist pullouts.** Clean, full-formed threads stab, spin in, tong up fast—and tight. Uniform depth of tough steel under the thread roots around entire circumference helps protect against pullouts.

**4** **Weld is strong, reliable.** Pipe is cold formed from flat-rolled steel—joined by strong electric-resistance weld without use of foreign metal. Weld area is as strong or stronger than wall itself.

Republic Electric Weld Casing and Tubing is available in sizes 2⅛″ through 13⅜″ O.D. in grades H-40 and J-55. Republic also produces Seamless Casing and Tubing in sizes 2⅜″ through 9⅝″ O.D., in grades J-55 and N-80. For complete information contact your nearest Republic Sales Office.

Or write to:

**REPUBLIC STEEL CORPORATION**
**GENERAL OFFICES • CLEVELAND 1, OHIO**
Export Department: Chrysler Building, New York 17, New York

**REPUBLIC CASING AND TUBING**
**Electric Weld and Seamless**

REPUBLIC STEEL

**Other Republic Products include Line Pipe—Steel and Plastic Pipe—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes**

**NOW . . . a NEW Rapid Start BALLAST**

**for longer lamp and ballast life**

**plus quiet, flickerless operation**

# APPLETON

## *"EFU" Explosion Proof*

## FLUORESCENT FIXTURES

## BRIGHT, SAFE ILLUMINATION FOR HAZARDOUS LOCATIONS

Complete protection against explosion hazards from lighting equipment is afforded this spray area through the use of APPLETON "EFU" Fixtures. Convenient angle mounting sheds light directly and evenly on the work area. Hazardous locations in refineries, grain mills, color printing plants, chemical plants, pharmaceutical concerns, etc., may be protected in the same manner.

● FOR SAFETY AND SAVINGS, specify *APPLETON "EFU" Explosion-Proof Fluorescent Fixtures and Fittings* . . . a complete quality line from one dependable source. Three different high power factor ballasts are available now, including a new "Rapid Start" for long lamp life, long ballast life without starters, and quiet, flickerless operation. Re-lamping is permitted from either end of fixture, and the APPLETON factory seal eliminates external seals normally required within 18 inches of arcing devices. Whatever the lighting problem, an APPLETON "EFU" installation assures maximum safety, high light output and trouble-free economical service.

*Sold Nationally*
*Through Electrical Wholesalers*

**2, 3 and 4-Lamp Fixtures . . . Straight or Angle Mounting**

2-Lamp Fixture | 3-Lamp Fixture | 4-Lamp Fixture

Choice of "Pre-Heat," "Slimline" or new "Rapid Start" ballasts. Designed for use with 40-Watt, 48-inch, T-12, and 85, 90 or 100-Watt, 60-inch, T-17 fluorescent lamps. End housings are cast aluminum with line connections made to a terminal block in the junction chamber.

**APPLETON ELECTRIC COMPANY**
1718 Wellington Avenue • Chicago 13, Illinois

*Also Manufacturers of:*

*Rely on* **APPLETON** *. . . The Standard for Better Lighting*

# Here's the 3-Zone Corrosion Problem in offshore structures and what you can do about it

## 1. ABOVE SPLASH ZONE

**Corrosive Conditions:** Surface normally dry; subject to salt-laden atmospheric attack; available for maintenance.

**Corrective Action:** This is where you can use protective coatings, when you adhere to adequate maintenance schedules.

## 2. SPLASH AND TIDAL ZONE

**Corrosive Conditions:** Surfaces alternate rapidly between wet and dry state due to spray which accelerates corrosion. Hard to reach for maintenance; paints unsatisfactory; continuous cathodic protection impossible: wear and shock area.

**Corrective Action:** This is the critical zone where you need Monel® sheathing. Five years ago, steel piling of a drilling platform in the Gulf of Mexico were sheathed in this zone with Monel and are still furnishing excellent protection against corrosive attack. Other structures have since been similarly sheathed. With its high degree of corrosion-resistance, high strength, ease of fabrication and welding, Monel has proven to be a highly practical means of protecting this critical zone.

## 3. BELOW TIDAL ZONE

**Corrosive Conditions:** Surfaces always wet; maintenance difficult.

**Corrective Action:** This is where to use sacrificial anodes suspended on Monel cables. (Remember that the cables meet the same corrosion problems the structure must withstand.)

**Good for semi-portable structures, too!** Three-zone protection has been applied to this tank battery barge by sheathing its 20-inch columns for a height of 6 feet in splash zone with 18 gauge Monel sheet, using "140" Monel welding electrodes.

**Get all the facts** on overcoming 3-zone corrosion in offshore structures. Write Mr. C. J. Brown, Inco Nickel Alloys Dept., The International Nickel Company, Inc., 67 Wall Street, New York 5, New York.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

INCO TRADE MARK **Monel** **Inco Nickel Alloys**
*"...It's the Seagoin'® metal"*

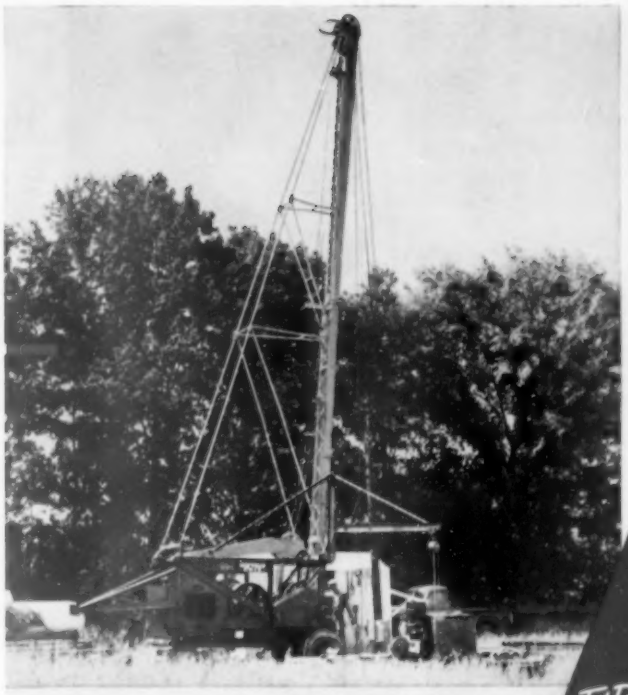
# 5 reasons why

## there are more Bucyrus-Erie Spudders In Use Today Than Any Other Make

| | | |
|---|---|---|
| 1 | BIG CAPACITY | Each model has plenty of capacity for its range. The largest Bucyrus-Erie machines handle up to 6,000 pounds of tools, drill top-to-bottom to 6,000 feet. |
| 2 | VERSATILE | With a Bucyrus-Erie spudder you are ready for any job — top-to-bottom drilling, deepening, drilling-in, workover, tube-and-rod servicing, swabbing, clean-out, etc. |
| 3 | FAST MOVES-- QUICK SETUPS | Lost time between jobs is at a minimum with Bucyrus-Erie spudders. They can be torn down, moved, set up, and put to work again in a few hours — not days. |
| 4 | HANDY OPERATION— ACCURATE CONTROL | Controls are conveniently arranged and grouped close to the hole. All operations are quickly and accurately controlled — you can stop drilling and start pulling tools in less than ten seconds. |
| 5 | STURDY CONSTRUCTION— LONG LIFE | Drilling machinery is held in rigid alignment by all-steel, electric welded fully-trussed box frames. Special-steel jackshafts, extra large clutches, and other features contribute to the ability of Bucyrus-Erie spudders to handle difficult jobs. 2554C |

See your local Bucyrus-Erie spudder distributor or write direct for complete information on these and other features of Bucyrus-Erie 60-L, 28-L, 36-L and 48-L spudders. Learn how these fast, versatile machines can speed up your drilling and get more done.

**BUCYRUS-ERIE COMPANY · South Milwaukee, Wisconsin**



60-L drills top-to-bottom to 1,500 ft., servicing to 2,000 ft. Swings up to 2,400 lbs. of tools. Handles static casing loads up to 40,000 lbs. with casing tackle strut.

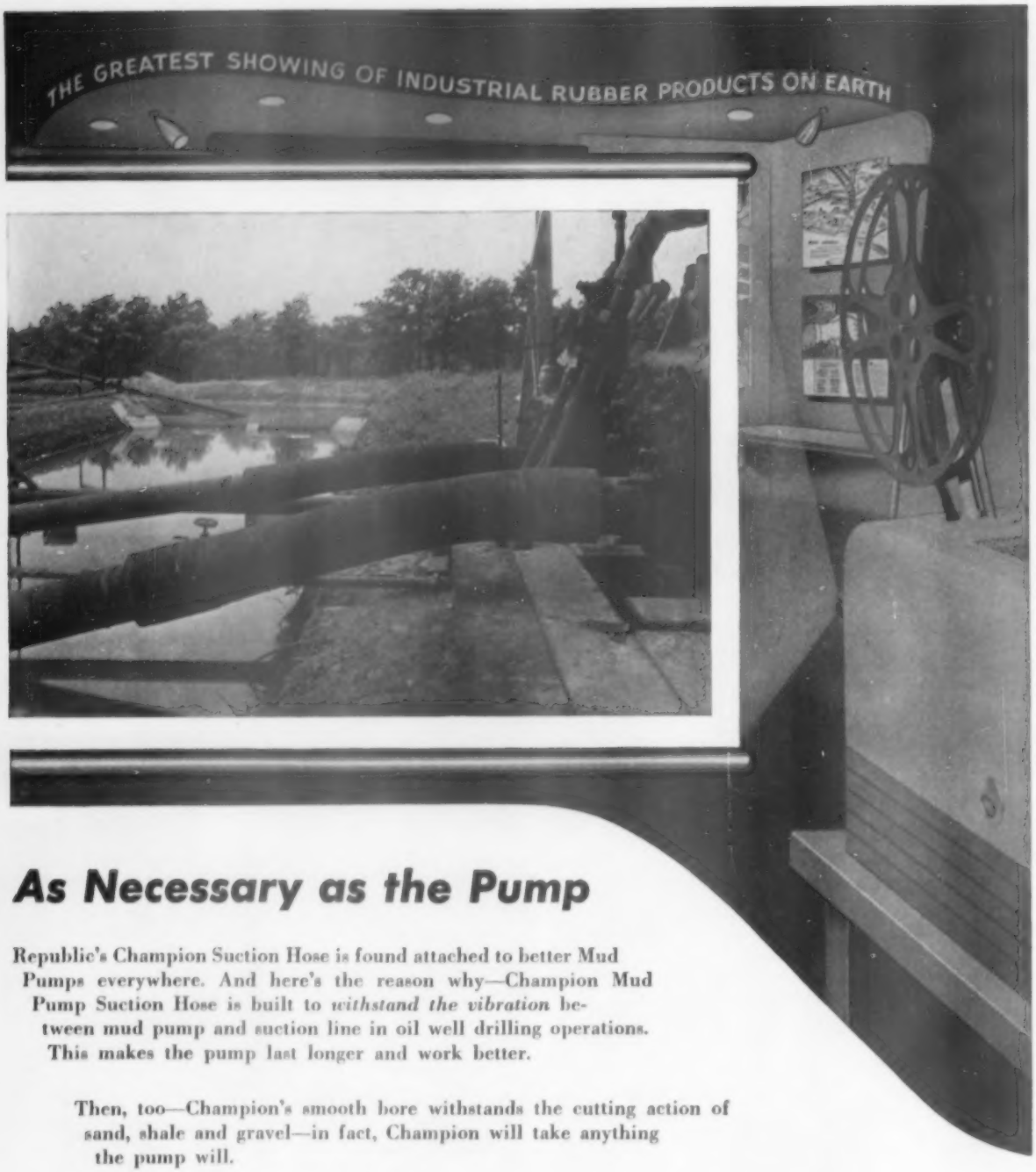
28-L drills top-to-bottom to 2,500 ft., servicing to 3,000 ft. Swings up to 3,000 lbs. of tools. Handles static casing loads up to 75,000 lbs. with auxiliary A-frame.

FIRST with the Finest in Spudders

36-L drills top-to-bottom to 3,500 ft., servicing to 4,000 ft. Swings up to 4,200 lbs. of tools. Handles static casing loads up to 120,000 lbs. with auxiliary A-frame.

48-L drills top-to-bottom to 6,000 ft., servicing to 7,000 ft. Swings up to 6,000 lbs. of tools. Handles static casing loads up to 160,000 lbs. with auxiliary A-frame. 300,000 lb. heavy-duty tripod derrick also available.

BUCYRUS ERIE




# As Necessary as the Pump

Republic's Champion Suction Hose is found attached to better Mud Pumps everywhere. And here's the reason why—Champion Mud Pump Suction Hose is built to *withstand the vibration* between mud pump and suction line in oil well drilling operations. This makes the pump last longer and work better.

Then, too—Champion's smooth bore withstands the cutting action of sand, shale and gravel—in fact, Champion will take anything the pump will.

So—to keep your mud pump operating at top efficiency—ask your Republic Distributor about Champion Mud Pump Suction Hose as well as the other oil field workers that Republic makes for you.

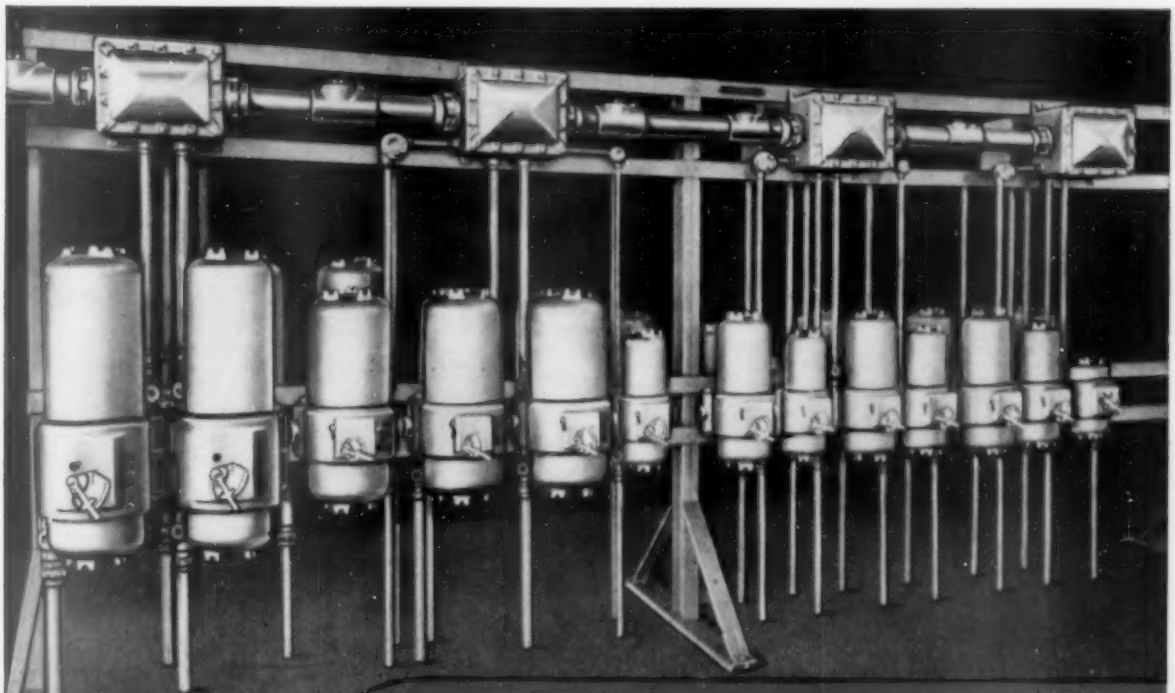
*"Quality Hose Builders for Over 50 Years"*

MID-CONTINENT DISTRIBUTOR
Jones & Laughlin Steel Corporation, Supply Division
P. O. Drawer 2481, Tulsa 2, Okla.

**REPUBLIC RUBBER DIVISION**
LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO
INDUSTRIAL RUBBER PRODUCTS

WEST COAST DISTRIBUTORS
Hendrie Belting & Rubber Co.
405 Towne Ave., Los Angeles, Calif.
Pacific Coast Rubber Company
51 Main St., San Francisco, Calif.

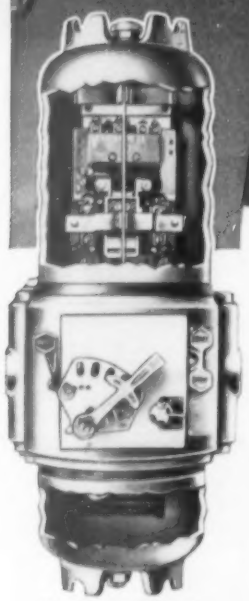

(For more data on advertised products, use our "Time Saver" yellow cards in this issue)



# CROUSE-HINDS Type EPC

## MOTOR STARTER and CIRCUIT BREAKER

## *Explosion-Proof* CONDULETS* are compact!



Type EPC Combination Line Starter Condulet with Broken-Away Covers Showing Interior Starter and Circuit Breaker Assembly

### Little space required for a big installation

Crouse-Hinds exclusive vertical cylindrical design conserves horizontal space that is always at a premium, speeds up installing and wiring, and saves money on the construction of steel mounting racks.

- **Explosion-proof, dust-tight,** and **weather-resistant** (raintight).
- **Light-weight cast aluminum** — for easy installation and maintenance. No lifting equipment required. Saves time and money.
- **Flame-tight threaded joints** throughout — the type of construction that was pioneered by Crouse-Hinds. Covers are taper-threaded with seven threads for extra safety. Operating shafts and bushings are thread-in-thread construction.
- **Seven conduit entrances** — give you the choice of either vertical or horizontal "through feed", "U" at either top or bottom, "T", or "L" at either side or back. Saves money by simplifying installation. Large central body — for easy wiring.
- **Built-in push button stations** and built-in selector switch are available.
- **Versatile.** Wide selection of well known controls. Starter sizes 0 to 5. Circuit breakers 50 to 600-Amp. frame sizes.
- The Crouse-Hinds Type EPC advantages all add up to **lower installed cost** and **lower maintenance cost.**

**CONDULETS are made only by CROUSE-HINDS*

A Nationwide Distribution Through Electrical Distributors

**CROUSE-HINDS COMPANY**
**Syracuse 1, N. Y.**

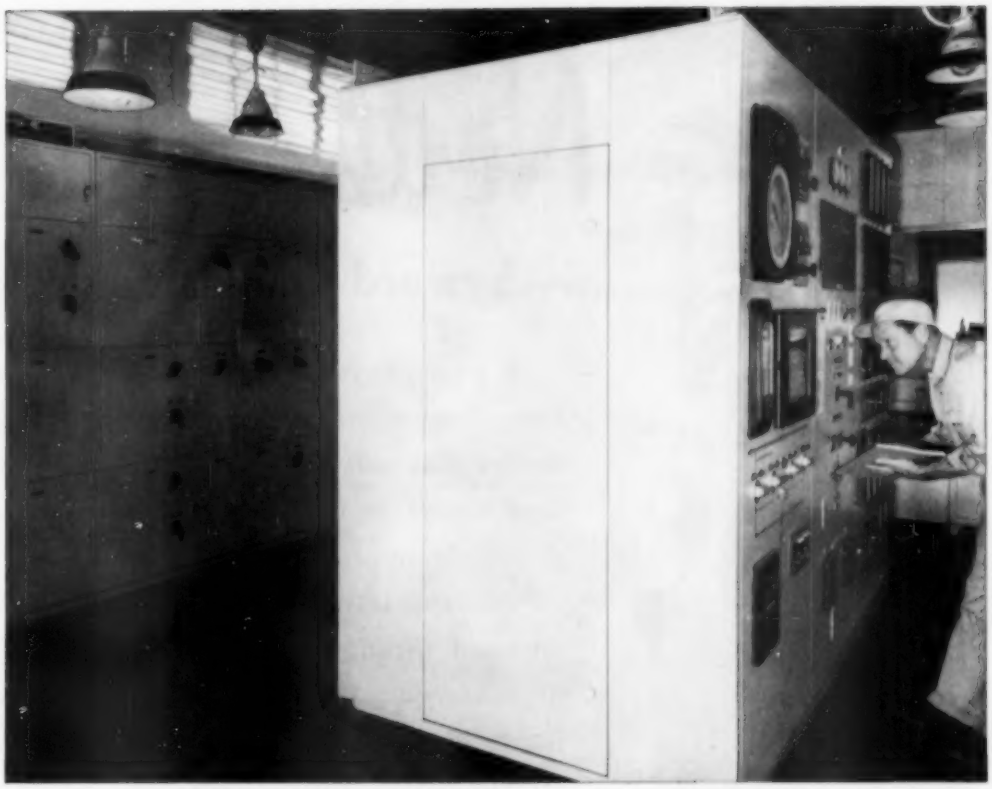
OFFICES Amarillo — Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston — Indianapolis — Kansas City Los Angeles — Memphis — Milwaukee — New Orleans — New York — Philadelphia — Pittsburgh — Portland Ore. — San Francisco — Seattle — St. Louis — St. Paul — Tulsa Washington RESIDENT REPRESENTATIVES Albany — Atlanta — Baltimore — Charlotte — Chattanooga — Corpus Christi — Reading Pa. — Richmond Va. — Shreveport Crouse-Hinds Company of Canada, Ltd. Toronto Ont.

**CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS**

**FLEXIBILITY** under widely varying operating conditions is one advantage of the G-E gas turbine. It can even be operated in the desert with no cooling water required except to replace very small losses in recirculating.

# G-E gas turbine helps United Gas

**GREATER EFFICIENCY** is provided at Napoleonville by this regenerator. Here, exhaust gases are used to heat air supply to 800 F before it enters the turbine combustion chambers to combine with the natural gas.



**COMPACT, COMPLETE, CONVENIENT,** the control equipment consists only of a starting and supervisory control station and an auxiliary control panel.

# reach all-time day delivery peak

## Pumps 510,992,000 cfd in first use of gas turbine-driven centrifugal compressor as initial main-line station

Four billion cubic feet per day of natural gas—that's the record delivery set in December, 1953 by United Gas Pipeline Co. Of this total, 510,992,000 cubic feet were pumped through United's new Napoleonville, La. station by a General Electric gas turbine.

*Called in early in the planning stage, G-E engineers assisted United's engineers in the design of the main compressor building, and helped co-ordinate electric equipment with the 5700-hp gas turbine.* Equipment delivery was carefully timed by G-E engineers to help complete the station on schedule. And the station has been continuously available for service since it first went on the line.

In your operation, too, a G-E gas turbine can pay big dividends.

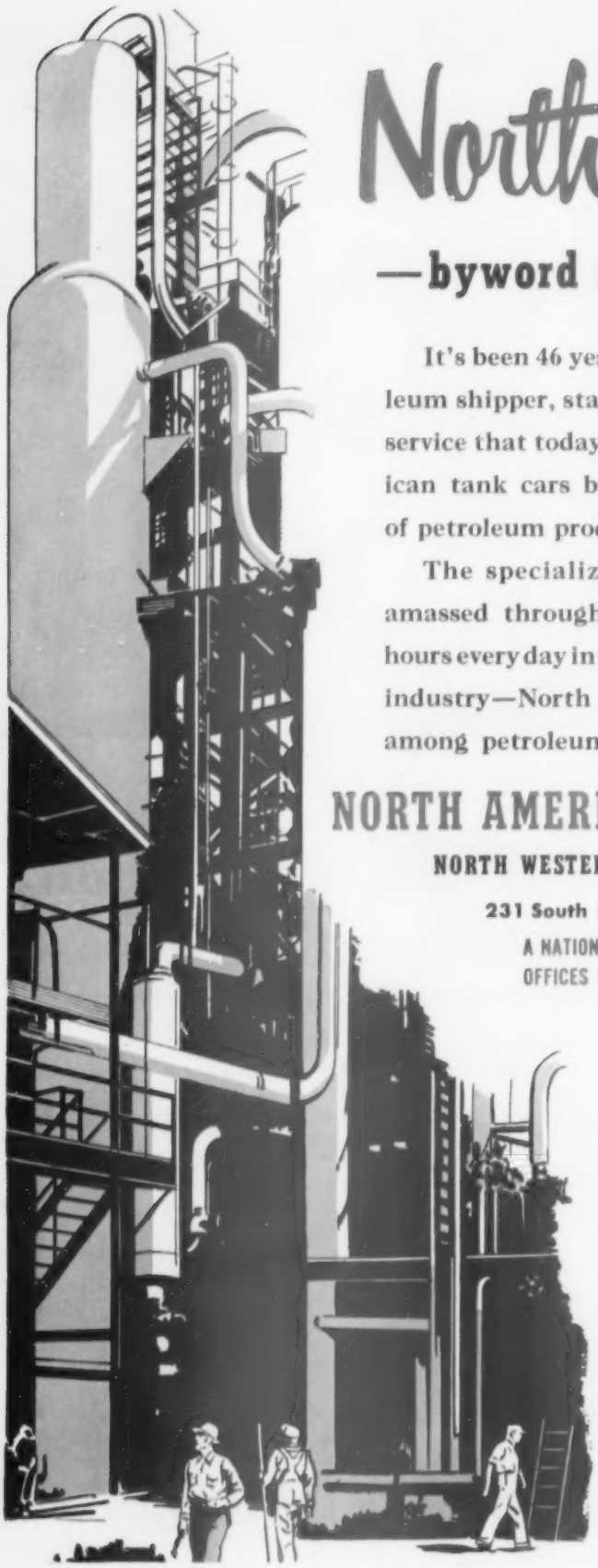
**Cuts total yearly costs.** It needs fewer operators than other types of pipeline drive—only seven men are used. With few moving parts, all rotating and easily accessible, maintenance costs are low.

**Provides more horsepower.** It produces more horsepower in cold weather, supplying up to 25 per cent more horsepower in the winter, when demand is greatest. Rotation speed is easily changed from 2000 to 5500 rpm to meet varying load conditions. And it starts fast—in 15 minutes, automatically, at Napoleonville.

When you plan to increase gas throughput, do as United did—avail yourself early of the many specialized G-E engineering services offered through your nearest G-E Apparatus Sales representative. General Electric Company, Schenectady 5, N. Y. 661-45

**Combustion Gas Turbines for the Gas Pipeline Industry—Backed by 45 years of Turbine Leadership**

**GENERAL ELECTRIC**



# North American

## —byword of petroleum shippers

It's been 46 years since we served our first petroleum shipper, starting a specialized transportation service that today keeps a great fleet of North American tank cars busy exclusively in the movement of petroleum products.

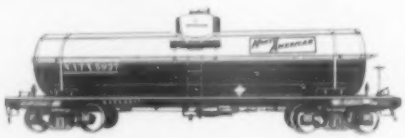
The specialized petroleum traffic knowledge amassed through those years now does a job 24 hours every day in maintaining top level service to the industry—North American service that's a byword among petroleum shippers. Take advantage of it.

**NORTH AMERICAN CAR CORPORATION**

**NORTH WESTERN REFRIGERATOR LINE COMPANY**

**231 South LaSalle Street, Chicago 4, Illinois**

A NATIONWIDE ORGANIZATION WITH BRANCH OFFICES IN IMPORTANT MARKET CENTERS



*For Special Products Requiring Special Care*

ROOM 1429 KIRBY BUILDING, DALLAS, TEXAS
739 PILLSBURY AVENUE, ST. PAUL 4, MINN.
SHELL BUILDING, ST. LOUIS 3, MO.
91 SOUTH MAIN STREET, FOND DU LAC, WIS.
681 MARKET STREET, SAN FRANCISCO 5, CALIF.
60 EAST 42ND STREET, NEW YORK 17, N. Y.
341 KENNEDY BUILDING, TULSA, OKLA.

# Tested patterns to meet today's needs . . .

## Jenkins cast steel Valves

**for dependable economy**

**in high pressure**

**—higher temperature services**

Mounting pressures and temperatures in power generation and industrial processing call for Cast Steel Valves. For this increasing need, Jenkins offers a wide selection of patterns that have met the test of the toughest services throughout industry.

In these valves, Jenkins provides a wide margin of strength and safety beyond ratings. Special refinements in design extend their service life, assure long, trouble-free performance. Efficiency and low maintenance records measure up to the high standards established for all valves developed by Jenkins Valve *specialists.*

The new Cast Steel Valve catalog gives complete information. Write for your copy today. Jenkins Bros., 100 Park Ave., New York 17.

**Get this NEW Cast Steel Valve Catalog**

Describes Globes, Angles, Gates, and Checks with detailed pressure ratings, dimensions, and other technical data covering all patterns of Cast Steel Valves now available from Jenkins. Send the coupon for your copy.

JENKINS BROS., 100 Park Ave., New York 17

Please send catalog of Cast Steel Valves.

Name .....

Company .....

Address .....

.....



(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

# Look how costs dropped when Diamond Chromates were added!

You have had to ante up many times for the staggering costs of corrosion. Do you know that in many cases these costs can be materially reduced? Here are some actual figures: One producing well was showing maintenance costs averaging $600 per month. Then DIAMOND Chromates were introduced.

Maintenance costs dropped to an average of $100 per month! A saving of $500 a month! Think how much you would save if all your losses from corrosion were cut in the same proportion.

You can easily get more facts and figures and the benefit of practical experience and technical know-how as well. Just call your DIAMOND representative. He will be glad to tell you of the many other cost and time saving applications for DIAMOND chemicals in the petroleum industry.

Call your nearby DIAMOND Sales Office or write DIAMOND ALKALI CO., 300 Union Commerce Building, Cleveland 14, Ohio.

## DIAMOND ALKALI COMPANY
CLEVELAND 14, OHIO

**DIAMOND SALES OFFICES:**

New York,
Philadelphia,
Pittsburgh,
Cleveland,
Chicago,
Cincinnati,
St. Louis,
Memphis,
Houston.

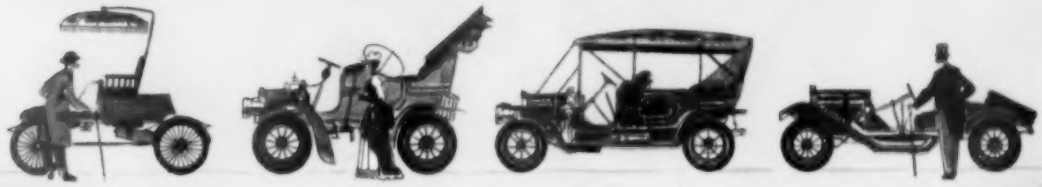
***Diamond Chemicals for the Oil Industry***

DIAMOND ALKALI CHEMICALS ®



(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

# WE WERE THERE...



# WE WILL BE THERE

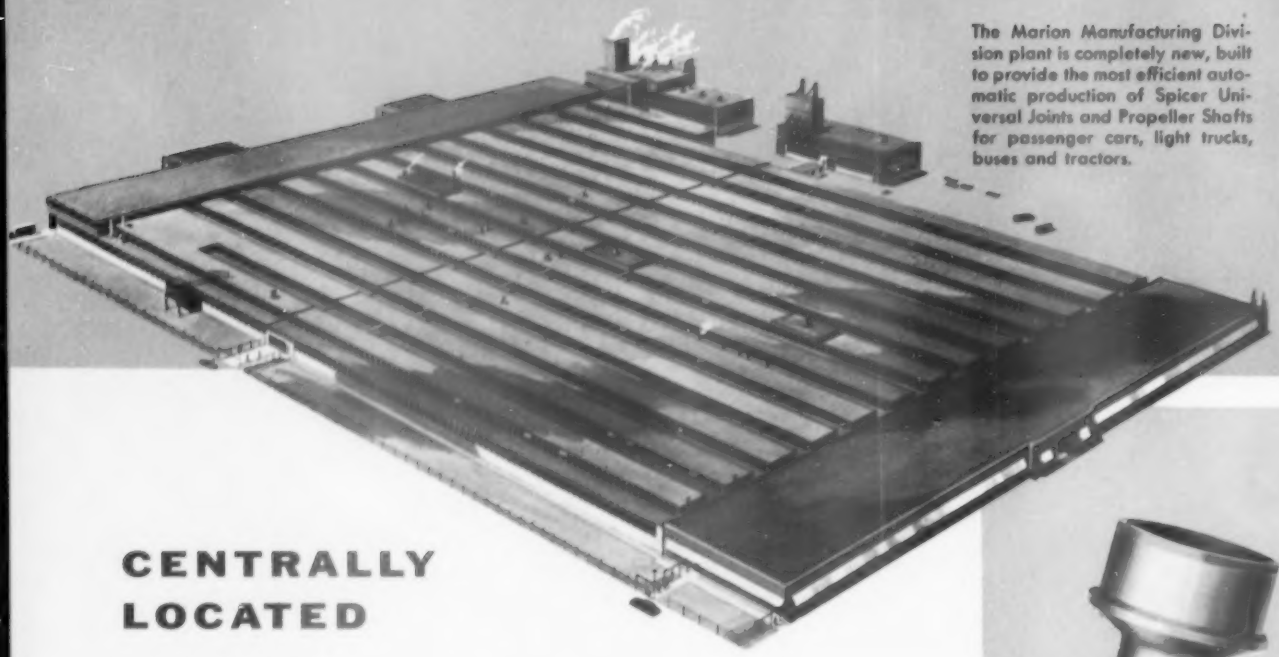
Spicer has been through all the phases and cycles of automotive development during the past 50 years. Spicer has been a major factor in the progress of the motor vehicle from a clumsy, noisy machine to a sleek, fleet, worldwide method of transportation.

Spicer now looks forward to its second 50 years of participation in automotive advancements. Working together hand in hand with designers and engineers on the vehicles of the future, the Dana organization will continue to develop Spicer power transmission units that will maintain their reputation as

*"The Standard of the Industry"*

DANA
MANUFACTURING

# THIS IS THE MARION MANUFACTURING DIVISION IN MARION, INDIANA



The Marion Manufacturing Division plant is completely new, built to provide the most efficient automatic production of Spicer Universal Joints and Propeller Shafts for passenger cars, light trucks, buses and tractors.

## CENTRALLY LOCATED

### and assuring a convenient, dependable source of supply for the automotive industry

For fifty years, Spicer Universal Joints . . . *first in the industry* . . . have been in volume demand because of outstanding service features:

1. True bearing alignment with rigid one-piece yoke design. *This rigidity is the essence of accuracy.*
2. Precision bearings with improved surface hardness and finish.
3. Dynamically balanced to exacting limits.
4. Uniform high quality propeller shaft tubing. *Steel meets our special specifications for Spicer propeller shaft needs.*
5. Wide selection of flange and yoke types and sizes to suit each individual requirement.

Spicer facilities are diversified and convenient, to fill your needs efficiently in power transmission units.

**SPICER MANUFACTURING DIVISION**
of Dana Corporation • Toledo 1, Ohio

50 YEARS OF Spicer SERVICE

ENGINEERING DANA MANUFACTURING

TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • BROWN-LIPE and AUBURN CLUTCHES • FORGINGS • AXLES • STAMPINGS • SPICER BROWN-LIPE GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • AIRCRAFT GEARS • WELDED TUBING

# Are you getting maximum high temperature tube life per dollar? *Ask the experts!*

*Vacuum fusion apparatus used to determine gases in steel. It's just one of the many phases of research on high temperature steel carried on by the Timken Company.*

SEVERAL of the high temperature steels listed below are probably adaptable to your particular conditions of heat, pressure, oxidation and corrosion. But, only *one* will give you maximum tube life per dollar, the best life/cost ratio.

To find that one, ask the experts!

Who are the experts? Metallurgists of The Timken Roller Bearing Company. They're recognized authorities on high temperature steels. Backed by over 20 years of experience, they'll help you choose the one best steel for your application from the 23 different analyses at their disposal.

You can be sure you'll get uniform quality, too. The Timken Company rigidly controls the quality of its steel with the most modern equipment known to the industry.

*Ask the experts!* The Timken Roller Bearing Company, Steel & Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

*This month the Timken Company reports on:*

**DM-2 STEEL**

Suggested as a substitute for 0.50% Mo. steel. Has greater creep strength and somewhat better corrosion and oxidation resistance than 0.50% Mo. steel. For use in cracking furnace tubes, high pressure boiler tubing, superheater tubing and high temperature steam piping.

**23 TIMKEN STEELS FOR HIGH TEMPERATURE SERVICE**

| | | | |
|---|---|---|---|
| Carbon | Sicromo 2 | Sicromo 5S | 16-13-3 |
| Carbon-Mo. | Sicromo 2½ | Sicromo 5MS | 25-20 |
| DM-2 | 2½% Cr.-1% Mo. | Sicromo 7 | 25-12 |
| Silmo | Sicromo 3 | Sicromo 9M | 25-15* |
| DM | 4-6% Cr.-Mo. | 18-8 Stainless | 16-25-6* |
| 2% Cr.-Mo. | 4-6% Cr.-Mo.-Ti. | 18-8 Cb | |

*Not available as seamless tubing at the present time.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

**TIMKEN**
Fine Alloy
**STEEL**

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

# Money-Savers

*Only Midwest "Long-Tangent" Elbows have these longer tangents (dotted lines indicate their length beyond ends of ASA Elbows). Tangents are ¼ of nominal diameter: a 12" elbow has tangents 3" long.*

This young man's dad also saves money. But he does it by specifying Midwest LONG-TANGENT Elbows whenever he needs welded piping. These elbows (see above) can be lined up with pipe more quickly and accurately. Less pipe is required and a short nipple (with its extra circumferential weld) is frequently eliminated. Slip-on welding flanges are easily used with minimum change in either flange or fitting. And then . . . Midwest "Long-Tangent" Elbows cost no more than ASA Elbows. You, too, can save money by specifying them on your next welding fittings order.

**MIDWEST PIPING COMPANY, INC.**

**Main Office: 1450 South Second Street, St. Louis 4, Mo.**

*Plants: St. Louis, Passaic, Los Angeles and Boston*

**Sales Offices:**

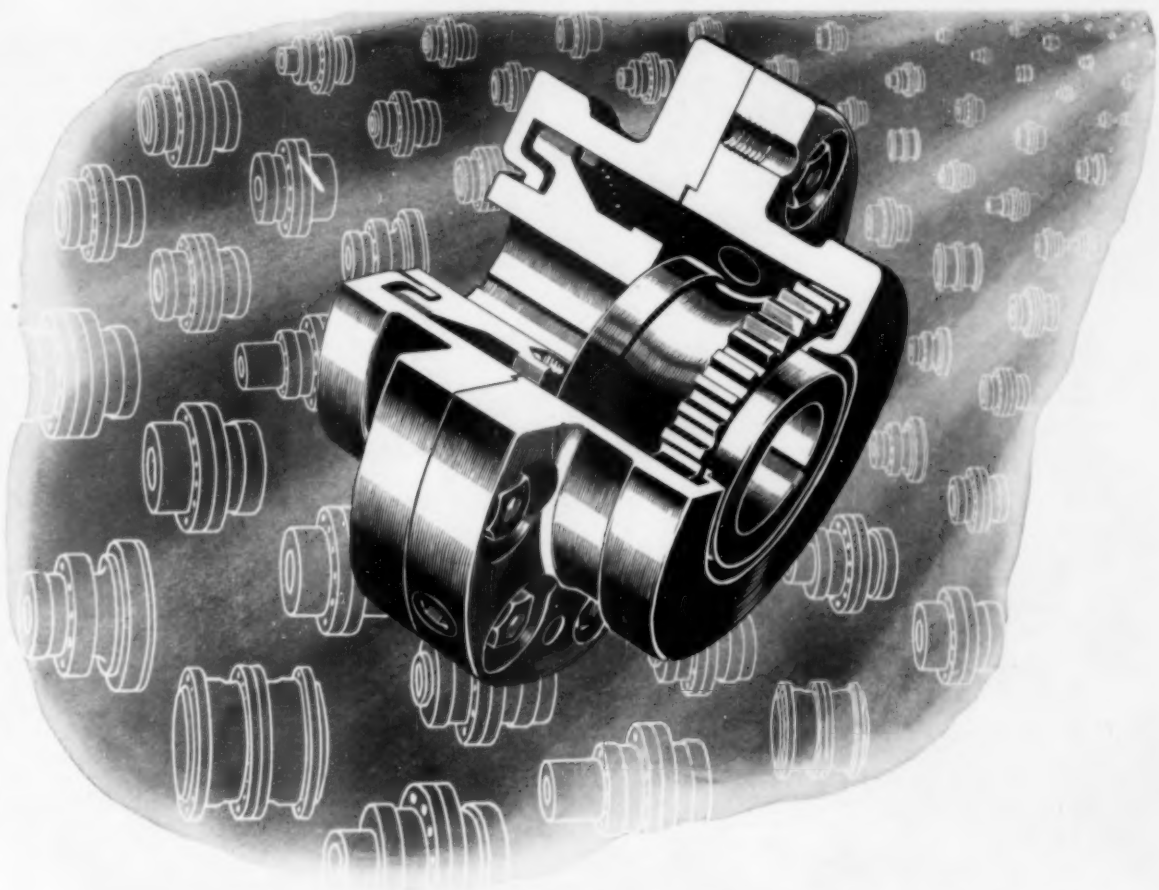
**New York 7—50 Church St. • Chicago 3—79 West Monroe St.**
**Los Angeles 33—520 Anderson St. • Houston 2—1213 Capitol Ave.**
**Tulsa 3—224 Wright Bldg. • Boston 27—426 First St.**

*STOCKING DISTRIBUTORS IN PRINCIPAL CITIES*

# MIDWEST WELDING FITTINGS

6107

## IMPROVE PIPING DESIGN AND REDUCE COSTS



## Hundreds of thousands of installations prove . . .

# FAST'S Couplings are FIRST!

There's no stronger endorsement of Fast's Couplings than the close to three-quarter million Couplings installed in the 33 years since their design revolutionized the power coupling business!

Trouble-free performance that saves down-time, maintenance, and money led to that record. And, whatever your coupling applications, it's a guarantee of what *you* can expect from Fast's! Fast's Couplings give you *rugged construction* . . . because their original design has been maintained without basic change or sacrifice in size or materials. Fast's Couplings give you *lowest cost per year* . . . because they usually outlast the equipment they connect. And Fast's Couplings give you the benefit of Koppers *free engineering service* . . . assuring you of the right coupling for any job and the right solutions to tough coupling problems.

Write today for full details to KOPPERS COMPANY, INC., *Fast's Coupling Dept.*, 286 Scott St., Baltimore 3, Maryland.

KOPPERS®

THE ORIGINAL

## *FAST'S Couplings*

**METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • BALTIMORE, MD.** This Koppers Division also supplies industry with American Hammered Industrial Piston and Sealing Rings, Koppers-Elex Electrostatic Precipitators, Aeromaster Fans and Gas Apparatus.

*Engineered* **Products Sold with** *Service*

**KOPPERS COMPANY, INC.,** *Fast's Coupling Dept.,* **286 Scott St., Baltimore 3, Md.**

**Gentlemen: Send me a Fast's Catalog giving detailed descriptions, engineering drawings, capacity tables and photographs.**

**Name** .....

**Company** .....

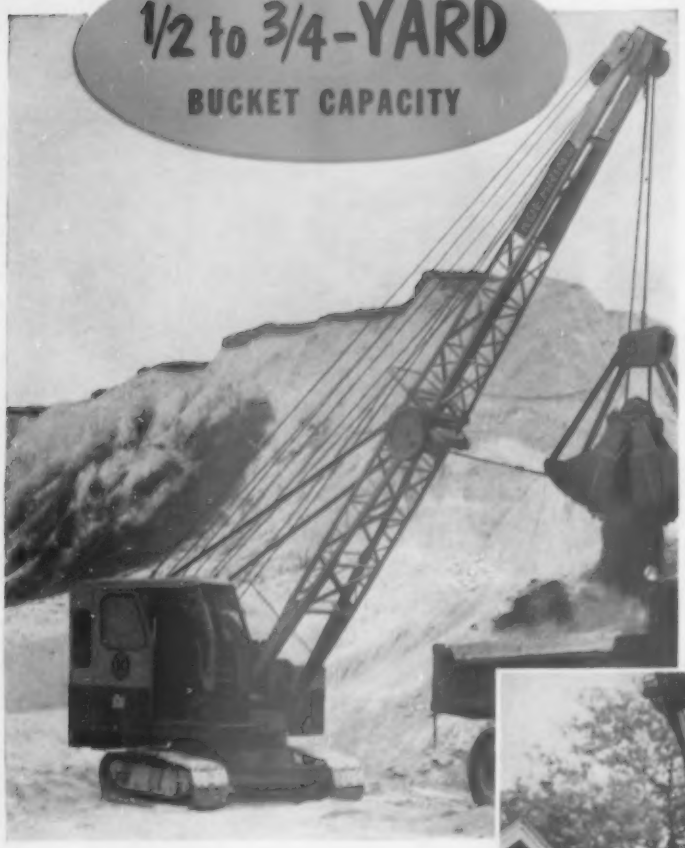
**Address** .....

**City** ..... **Zone** ..... **State** .....



(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

# 1/2 to 3/4-YARD
## BUCKET CAPACITY



**NEW Koehring 205** with 10 tons of lift capacity on crawlers (15 tons on rubber) has plenty of power, strength and stability to handle ½ to ¾-yard clamshell and dragline buckets on a wide work radius. Boom lengths range from 30 to 50 feet on the 205 crawler crane (25 to 55 feet on truck crane).

**Crawler-mounted 205** with either standard or extra-long crawler frames, takes 16, 20 or 24-inch shoes . . . gives you ground-bearing pressure as low as 7.4 pounds per square inch. Crawlers are self-cleaning, have double-faced steel rollers, and high-carbon cast-steel shoes.

**If mobility is needed** the 205 is available on rubber . . . gives you the *plus* advantage of 15-ton lift capacity and 32½ m.p.h. travel speeds for clamshell, dragline and lift crane work. Converts to ½-yard shovel or hoe. Better look into this rugged new machine today.

### With HEAVY-DUTY 205 you also get:

- **Full-rotating fairlead on dragline.**
- **Power boom lowering optional.**
- **Big 20-inch clutches, self-adjusting.**
- **Only 2 major shafts in upper machinery — simple, accessible.**
- **Antifriction power flow for dig, hoist, swing, and travel.**
- **4 hook rollers, eccentric adjustment.**
- **Automatic traction brakes.**
- **Independent traction, optional.**

**PROVED** *by 2 years of thorough field tests, Koehring 205 brings you this 10-to-15-ton capacity at only "½-yd." price. Get complete details from Koehring distributor, or write.*

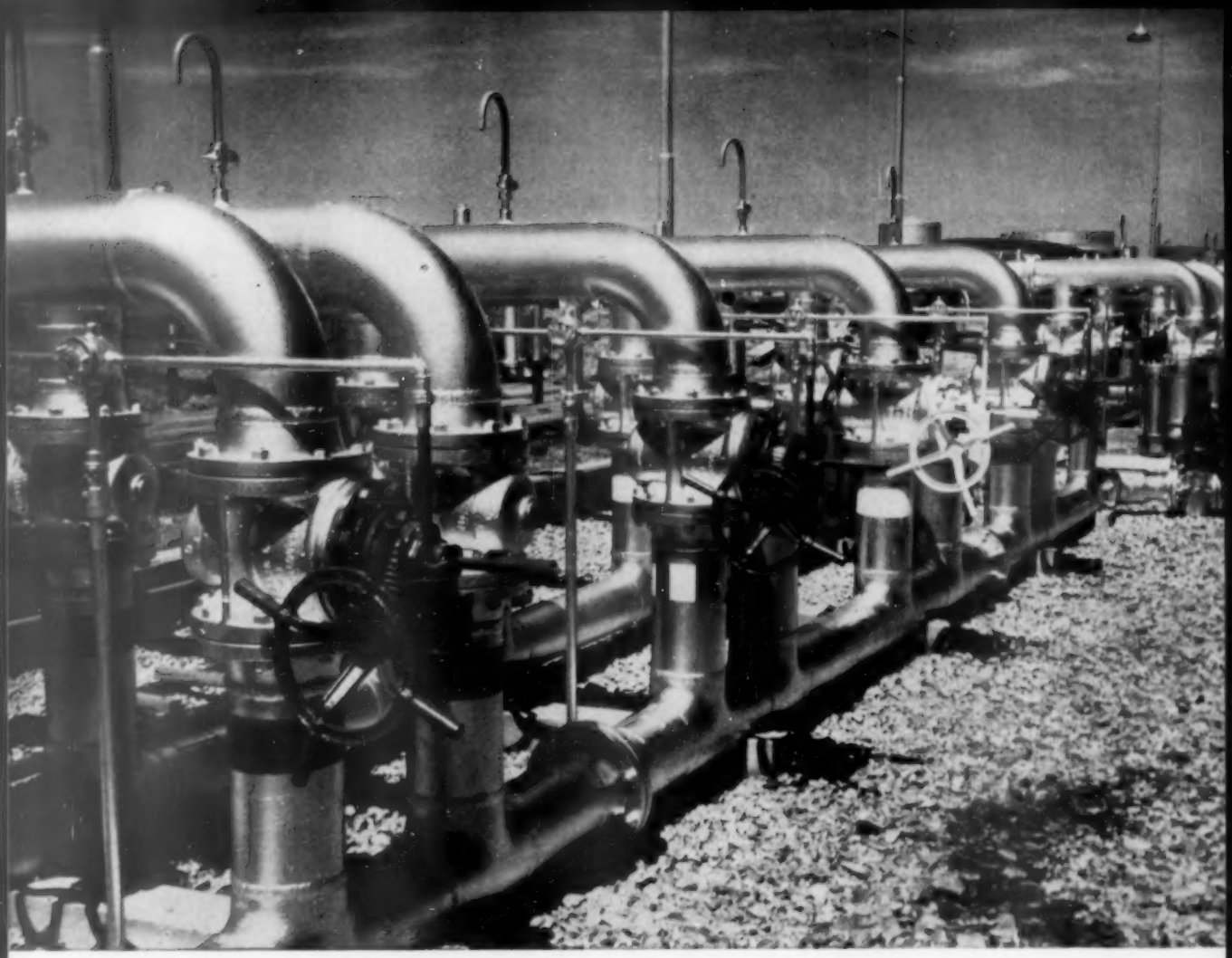
OGJ

To: KOEHRING COMPANY, Milwaukee 16, Wisconsin
*Send us bulletin on the new heavy-duty 205.*

NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY _____ STATE _____

**KOEHRING COMPANY**
*Subsidiaries:*
JOHNSON • KWIK-MIX • PARSONS

8485



# In Every NORDSTROM VALVE—*the Extra Benefits of Internal Lubrication*

Nordstrom valves are made in a wide assortment of styles and metals—each especially designed to handle certain fluids at specific temperatures and pressures.

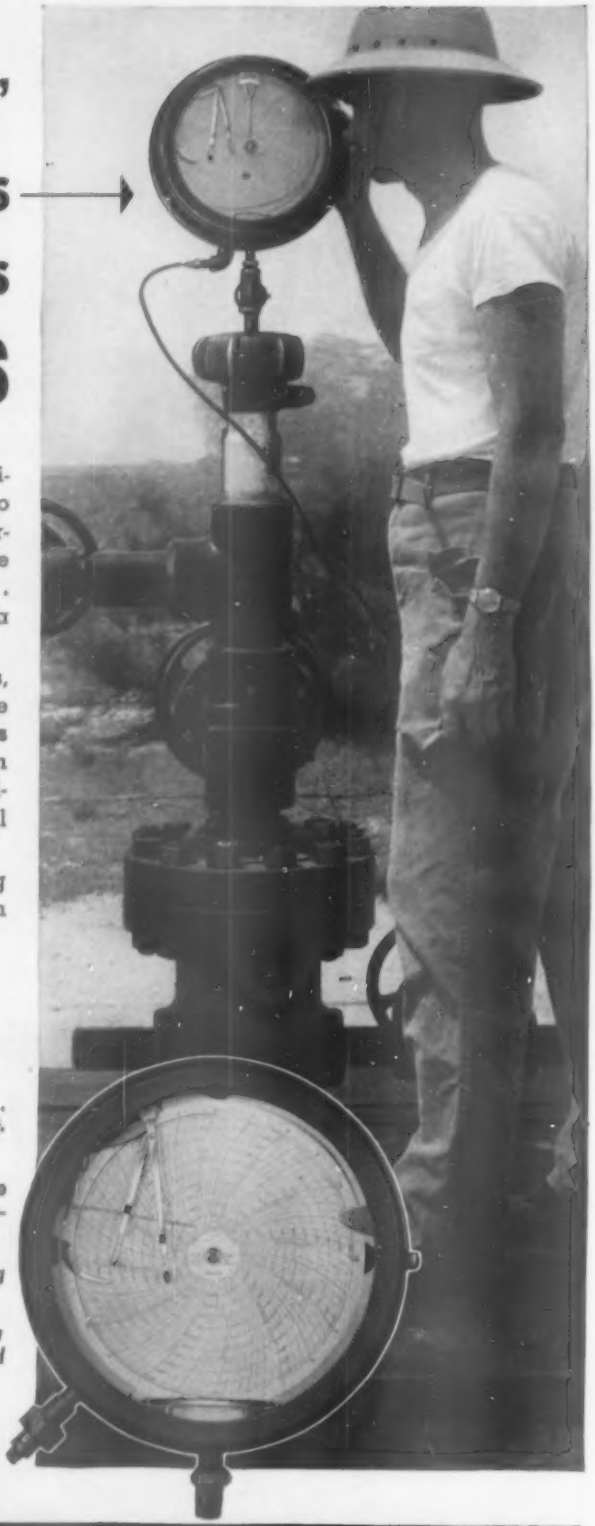
But there are a number of features common to all Nordstrom valves—a seal of lubricant that prevents leakage and protects the vital seating surfaces from abrasion . . . a quick quarter turn to open or close . . . positive rotary action that maintains an intimate contact between working surfaces . . . no pockets or cavities to catch sediment . . . genuine Rockwell lubricants.

These features, embodied in every Nordstrom valve regardless of the function for which it was designed, are your guarantee of efficient control on any petroleum service. Rockwell Manufacturing Company, Pittsburgh 8, Pennsylvania. *Canadian Valve Licensee: Peacock Brothers Limited.*

**ROCKWELL-Nordstrom VALVES**

*Lubricant-Sealed for Positive Shut-Off*

# "Inside information" like this on rock pressure trends PAYS DIVIDENDS



By keeping continuous, accurate records of significant trends in tubing and casing pressure, Foxboro Pressure Recorders can help you plan oil well operations most efficiently. They give important "inside information" on the life expectancy of wells . . . information that you can use advantageously as a work guide.

Built to withstand all sorts of weather conditions, Foxboro Pressure Recorders are ideally suited to the job. Their compact, die-cast aluminum case is weatherproof. Their sturdy, precision construction assures long service life and lasting accuracy. Typical features that have made them so valuable to oil production are shown below.

Get all the facts about these high-fidelity Tubing and Casing Pressure Recorders. Write for Bulletin 22A.

## BRIGHTEST STAR ON THE CHRISTMAS TREE

★ **All-welded, alloy steel helical movement . . .** *functions accurately, without fatigue, even under pulsating pressure.*

★ **Easy range-changing** *without disturbing piping, made possible by union connection at base of helical movement.*

★ **Dual range charts . . .** *show both tubing and casing pressures.*

★ **Two speed chart drives . . .** *available to provide a 7-day speed for normal operation and a 1-day speed for quick close checking.*

**The Foxboro Company**
**606 Neponset Avenue**
**Foxboro, Mass, U.S.A.**

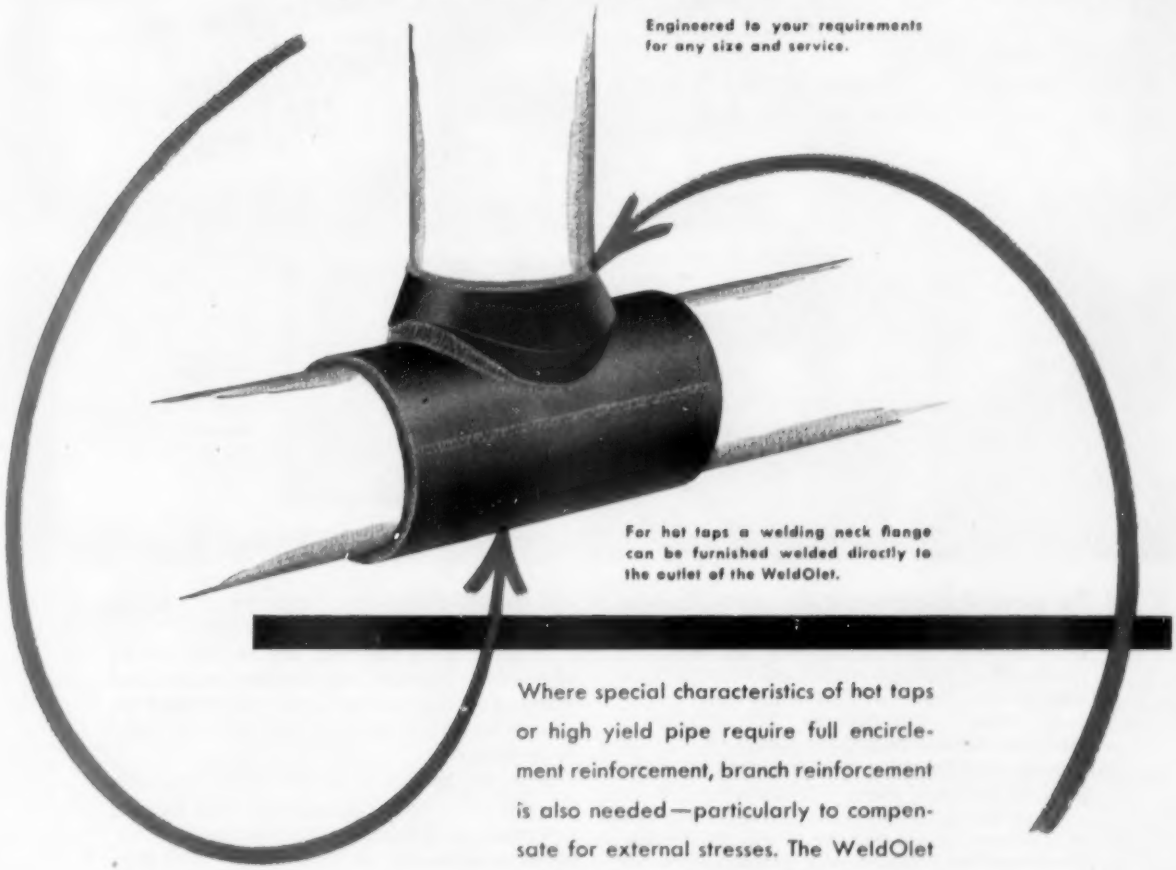
**FOXBORO**
REG. U. S. PAT. OFF.

**INSTRUMENTS FOR OIL PRODUCTION**

# announcing BONNEY'S

## New WeldOlet Split Tee for hot taps and new construction

**Assembled and Ready for Field Installation, the WeldOlet Split Tee "Nails Down The Lid" where Full Encirclement Reinforcing is Needed.**


Engineered to your requirements for any size and service.
For hot taps a welding neck flange can be furnished welded directly to the outlet of the WeldOlet.

Where special characteristics of hot taps or high yield pipe require full encirclement reinforcement, branch reinforcement is also needed—particularly to compensate for external stresses. The WeldOlet Split Tee satisfies this combined requirement in the most economical manner.

*Write or phone today for general information or about your specific requirements.*

**BONNEY FORGE & TOOL WORKS**

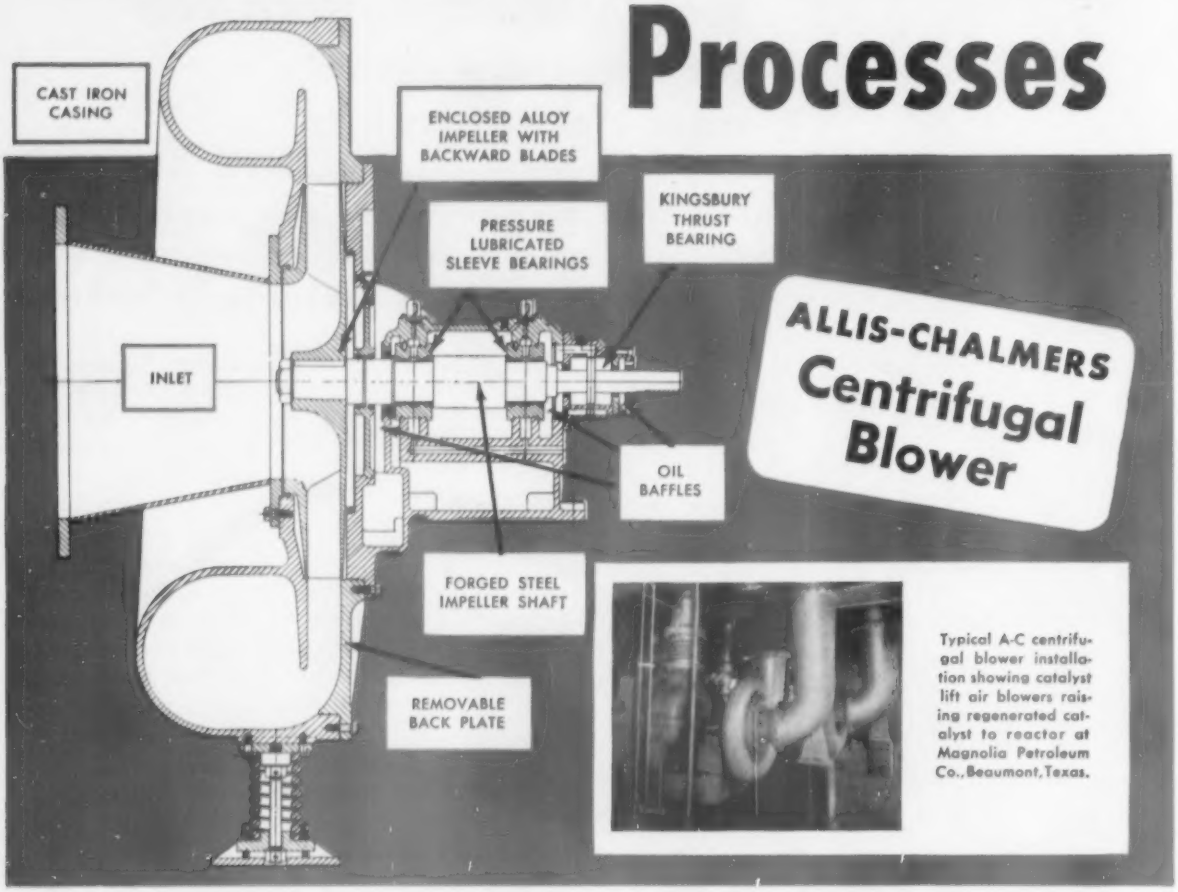
WELDING FITTINGS DIVISION

ENG. DEPT., 366 GREEN ST., ALLENTOWN, PENNA.



(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

# Air for New Cracking Processes






Typical A-C centrifugal blower installation showing catalyst lift air blowers raising regenerated catalyst to reactor at Magnolia Petroleum Co., Beaumont, Texas.

**To meet this nation's** ever-increasing demands for premium and aviation gasolines, more efficient cracking methods are being devised. Allis-Chalmers centrifugal blowers are a vital part of these new fluid processes.

At refinery after refinery, Allis-Chalmers units are withstanding the requirements of continuous operation . . . providing maximum dependability under every condition.

The cross-section drawing above shows some of the outstanding features of a typical Allis-Chalmers blower. The totally enclosed, all-welded alloy steel impeller offers highest efficiency, and backward flow design provides outstanding pressure and volume characteristics.

High strength and long life are assured by all-welded alloy steel impeller construction and pressure lubricated sleeve and thrust bearings. Cast iron casing increases rigidity and decreases noise level.

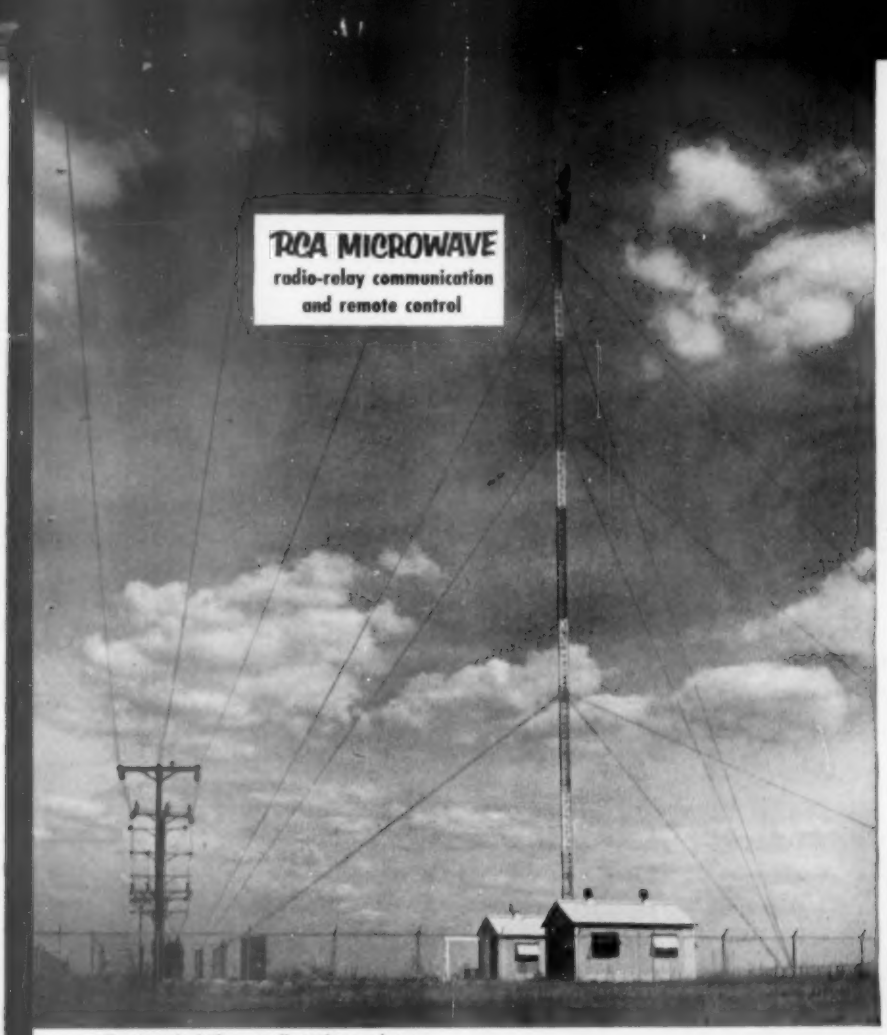
You can benefit from Allis-Chalmers wide experience in building and applying blowing equipment in the petroleum industry. For detailed information call your nearest A-C sales office, or write Allis-Chalmers, Milwaukee 1, Wis.

A-4234

**ALLIS-CHALMERS**

*Texrope* is an Allis-Chalmers trademark.

*Power, Electrical, Processing Equipment for Petroleum Industry*




**Unattended "booster" stations**—interspaced with regular pumping stations—increase pipe line capacity 25%

**Close-up of equipment** at unattended "booster" station. Cabinet open at right displays 960-mc RCA Microwave transmitter-receiver

# How remote supervisory control (via Microwave) helps SUNRAY reduce pipe-line operation costs

TWO YEARS of successful operation have proved that Sunray Oil Corporation's microwave system is a cost-cutting investment. *Two* operating positions now fully control *five* pumping stations. At the same time, 25% *greater volume can be run through the pipe lines.*

A 97-mile pipe line is used to interchange products between the company's refineries at Sunray Village (Duncan) and Allen, Oklahoma. An attendant at the main pumping station controls and monitors two unattended booster pump stations. On another pipe line 85 miles long, the operator at the main station controls a "booster" 31 miles away. On both pipe lines, RCA 960-mc Microwave systems link the control points and remote-operated "boosters."

### HANDLES MANY CHANNELS

Sunray engineers selected RCA Microwave on the basis of cost, reliability, and capacity. Because of its capacity, microwave is the least expensive form of communication *per channel mile.*

Maintenance-wise, too, microwave cuts costs. Unattended relay stations, spaced miles apart, cost less to maintain than direct wire. RCA Microwave is virtually weatherproof . . . outage time is next to zero.

### HAS HISTORY OF RELIABILITY

Since 1946, RCA has installed many fully reliable microwave systems, some over a thousand miles long. All have proved themselves in performance—for utilities, government agencies, telegraph companies, turnpikes, as well as pipe lines.

In addition to remote control and supervisory functions, RCA Microwave provides as many voice and teletype channels as needed—and does it with a minimum of frequency space. It employs readily available tubes and familiar circuits which are easy to service. It can be interconnected with telephone lines, switchboards and mobile communication systems.

### COMPLETE SERVICE AVAILABLE

If desired, RCA supervises survey, construction and installation—provides a complete single-source, single-responsibility service. *For complete information, mail the coupon below.* And remember, the RCA Service Company provides nation-wide installation and service facilities.

RCA ® **RADIO CORPORATION of AMERICA**
COMMUNICATIONS EQUIPMENT CAMDEN, N. J.

Dept. F89, Building 15-1

Without obligation on my part, please send me your *free* booklets on:

☐ Pipeline Microwave Systems ☐ Radio-controlled Booster Increases Production

Name_____ Title_____

Company_____ Address_____

City_____ Zone____ State_____

☐ Have an RCA representative get in touch with me.

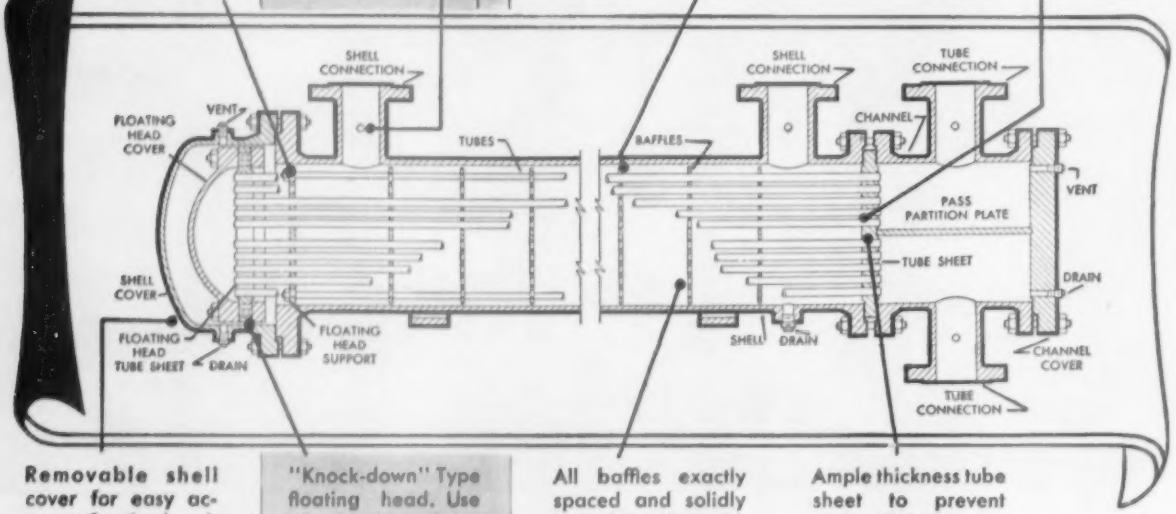
# HEAT EXCHANGER EFFICIENCY starts with SUPERIOR DESIGN

"Do-Nut" shape support plate offers maximum support to the floating head without undue strain on the tubes, and tube surface loss.

Connection for pressure gauge and thermometer provided on all flanged connections.

Baffles — cross flow segmental type machine cut and drilled. Close tolerances assure maximum heat transfer.

Tubes — expanded into tube sheets by means of electronic controlled roller expanders, tubes cannot be over expanded or work hardened.




**Removable shell cover for easy access to floating head.**

"Knock-down" Type floating head. Use of floating head minimizes thermal expansion strains.

All baffles exactly spaced and solidly bolted together with heavy tie rods and spacers.

Ample thickness tube sheet to prevent undue deflection at pass partition plate.

The features of design which make a heat exchanger good are the features which contribute most to efficient, long-lived, trouble-free performance *under your operating conditions*. Since operating conditions are seldom exactly duplicated, industrial heat exchangers are usually custom-built . . . and design characteristics are different for each application.

But while design characteristics differ, the fundamentals of good heat exchanger construction never change. If you are considering the purchase of heat exchanger equipment, we welcome the opportunity of showing you how SUPERIOR Heat Exchangers combine tested fundamentals with design features that fit your use . . . for performance you can BANK on.

Write for your copy of catalog 6011

*for performance you can* **BANK** *on*

**SUPERIOR COMBUSTION INDUSTRIES INC.**
**TIMES TOWER, TIMES SQUARE, NEW YORK 18, N.Y.**

SUPERIOR HEAT EXCHANGERS

*EC&M Bulletin 1062 Type ZHS 2300-volt Motor Starter in Type VIII enclosure for Class I, Group D hazardous atmospheric locations.*

# Motor Starters

**2200 TO 5000 VOLTS**

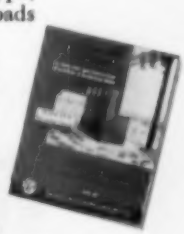
## HELP BOOST PETROLEUM PRODUCTION

● For maximum protection in hazardous locations, all connections, terminals and arcing parts of these Type ZHS Motor Starters are oil-immersed. In addition, oil-immersion keeps the mechanism thoroughly lubricated and protected against corrosion . . . eliminates the need for frequent inspection or maintenance.

These motor starters have self-contained, adjustable overload relays with inverse-time-element feature which protects motors from overheating as a result of overload, loss of one phase or failure to start. Of combination type, these relays assure instantaneous trip on heavy overloads or short circuits.

EC&M Type ZHS Starters for 2200 to 5000-volt motors are built in 50,000 KVA interrupting capacity and in the VALIMITOR (volt-ampere-limitor) style for use on power systems having infinite KVA.

Throughout the petroleum industry, EC&M Motor Starters are providing continuous safe service . . . helping to boost petroleum production.



*Write for Booklet 1062 describing EC&M 2200-5000-volt motor starters*

1054

**THE ELECTRIC CONTROLLER & MFG. CO.**

2698 EAST 79TH STREET • CLEVELAND 4, OHIO



(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

# CATFORMING *means*

# SIMPLICITY

## for high octanes and high yields at low cost

Simplicity is the keystone of Catforming. Why? Because simplicity takes the high cost out of high octanes and high yields.

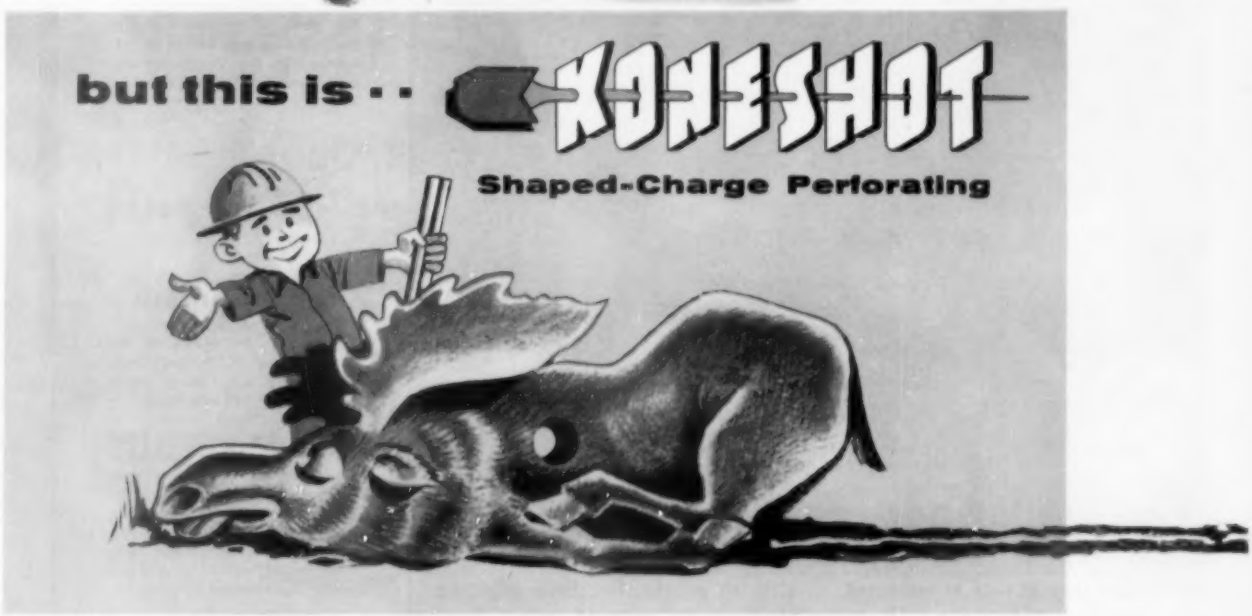
Simplicity speeds construction of Atlantic Catforming units—saving you money and time.

Simplicity makes operation of these units easy—saving you money on operating costs and manpower as well.

Simplicity means efficiency — Catforming cuts out intermediate steps in processing feed stocks, gives you high octane gasoline ready for immediate blending—and distribution.

Simplicity goes all the way with Catforming, including the licensing agreement—you'll find it well worth looking into. Remember, the performance of Catforming units has been proved in highly successful commercial operations in many areas. Write, wire or phone for detailed information — ask for our brochure, "CATFORMING." The Atlantic Refining Company, Research and Development Dept., P. O. Box 8138, Philadelphia 1, Pa.

ATLANTIC *It's the Catalyst that counts*




KONESHOT is the shaped-charge perforation that gives you *penetration plus!* Penetration *plus* the highest degree of accuracy in depth measurement. Penetration *plus* the greatest possible safety for well crews (the Lane-Wells safety record proves that!). Penetration *plus* on-the-dot, on-the-spot service—*quick* service by experienced local men who know *your* conditions and know how to meet them. All in all, penetration *plus*, to bring in the production you have a right to expect.

**Write for further information on LANE-WELLS KONESHOT**

LANE-WELLS COMPANY

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*General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58*

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

AK-710

# The leader has lengthened its lead!

From the day it was announced, the Marsh Mastergauge took the lead in the pressure gauge field. You are probably well aware of this . . . but do you realize that we have constantly given it plus qualities to still further *lengthen* its lead?

Look at the recent developments presented opposite. Unquestionably these are the three greatest strides in gauge development since the creation of the Marsh "Recalibrator."

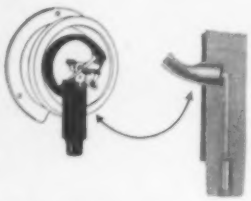
Yes, the three basic gauge components have been brought to a remarkable stage of perfection in the Mastergauge. Certainly, for every critical service there is no gauge to compare with it!

Mastergauge is standard bearer for the world's broadest line of gauges and dial thermometers, each the best of their kind in the applications for which they are recommended. Ask for data covering your specific needs.

**MARSH INSTRUMENT CO.** *Sales Affiliate of Jas. P. Marsh Corporation*
Dept. L., Skokie, Ill.

ONLY MARSH HAS THE "RECALIBRATOR"

**MARSH** THE STANDARD OF ACCURACY

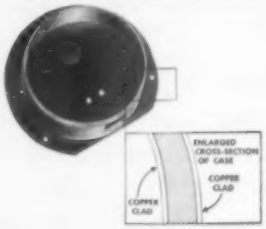


## 1—A better tube construction—

The Mastergauge always had the most effective joining of the bourdon tube to the socket . . . but . . . one-piece construction is *always better!* Welding these dissimilar parts posed a tough problem . . . but we finally solved it by a new process—the "Conoweld" process—exclusively ours. The photo of an actual section shows the perfect fusion. Socket, tube—even the end-piece—are fused into one leak-tight unit.

## 2—A better movement—

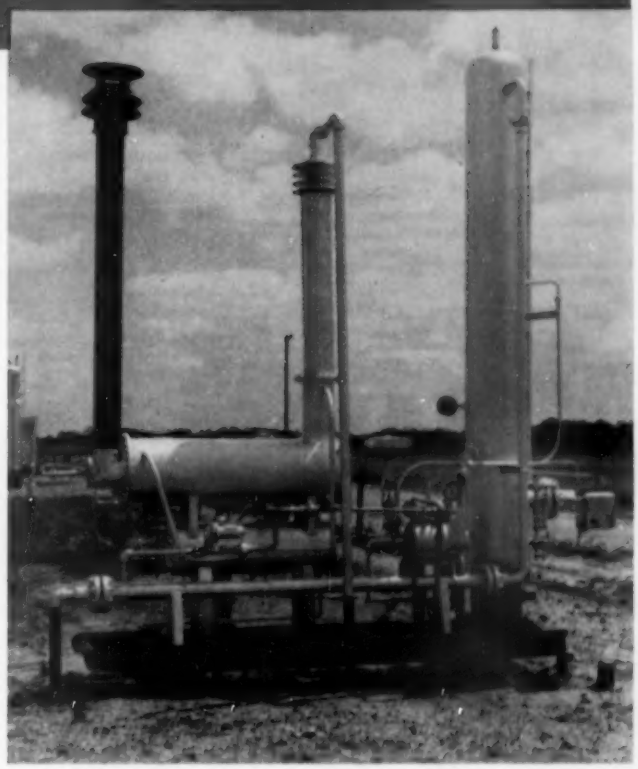
To convert the action of the bourdon tube into accurate pressure indication, the gauge movement must be rugged, practically frictionless, highly resistant to corrosion. A self-lubricating effect is achieved in the Mastergauge movement by using alternate stainless steel and monel—gears stainless, bushings "K" monel, and so on. A distinguishing feature is the "coined" sector gear. Note broad face of gear which results from this coined extrusion.




## 3—A better case—

Another development that has increased Mastergauge leadership is the new copper-clad, wrought steel case. The case has the strength of steel and the resistance to corrosion of copper. It is four times as strong as a cast iron case and one-third lighter. Final finish is a handsome corrosion resistant black enamel. Every case is fitted with Marsh safety blow-out plug—a typical advancement.

# *Improved* DEHYDRATION
## WITH M.-C. GLYCOL TYPE UNIT



- ★ Maximum Pump Life
- ★ Minimum Loss of Glycol
- ★ Minimum 50° F. Dew Point Depression
- ★ Reduces Fire Hazard and Packing Breakage
- ★ New Bubble Tray Design Allows Operation with Cold Gas and Eliminates Glycol Foaming

Long pump life is insured by having the final heat exchanger upstream of the pump, thus avoiding 250° F. temperatures for the packing and other parts. The flow of cool glycol to the top tray at the start of the cycle assures better dehydration and less glycol loss to the outgoing gas. A reliable level controller for the absorber prevents blowing gas through the still and reboiler, reducing fire hazard and packing breakage. All in all the Maloney-Crawford Dehydration Unit overcomes most of the problems which have been common to this type of dehydrator. Let a M.-C. representative present you all the details.

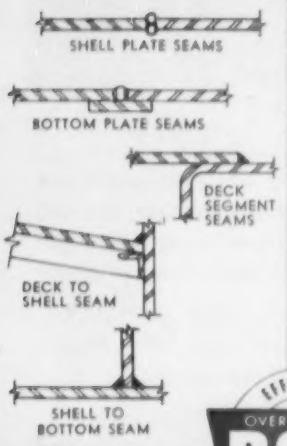
# MALONEY CRAWFORD

MALONEY-CRAWFORD TANK & MFG. CO.

**FACTORY AND GENERAL OFFICE:** 38 North Peoria—Box 659—Tulsa, Oklahoma.
**EXPORT REPRESENTATIVE:** Baird Lines, 420 Lexington Avenue, New York, N. Y.
**CANADIAN REPRESENTATIVE:** Maloney-Crawford Tank & Service Company, Ltd., Edmonton, Alberta
**TEXAS PANHANDLE REPRESENTATIVE:** Atlas Tank Company, Pampa, Texas

# Too BIG For "Over-The-Road" Delivery – These Tanks Were..

**Typical BS&B Weld Seams**




## *FIELD-WELDED By BS&B!*

Many states prohibit trucks from hauling tanks of more than 20 ft. diameter over the highways. If regulations in your area prevent "over-the-road" delivery of large diameter shop welded tanks to your lease, simply specify *field welded* tanks—by BS&B!

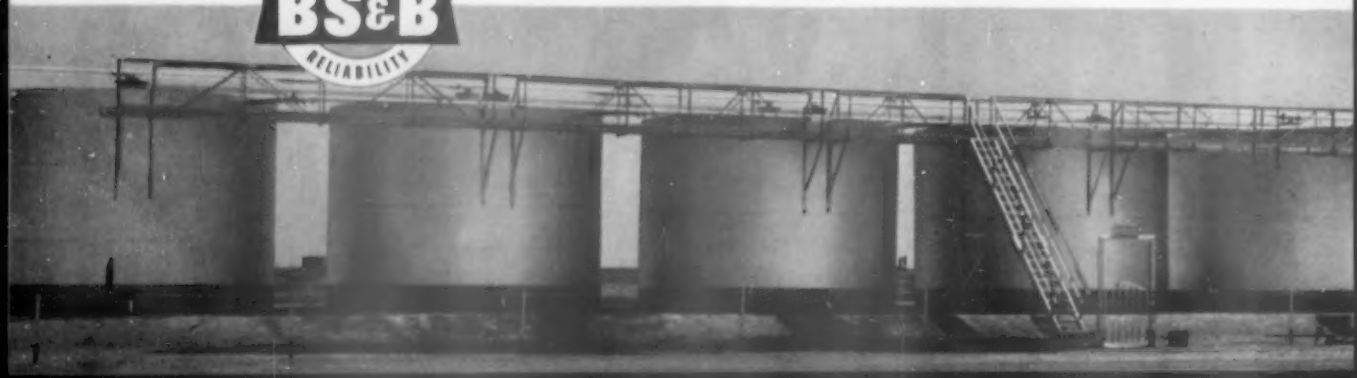
These tanks are fabricated from large, uniform grade C-1012 steel plates, rolled to a specific diameter and butted together with full penetration welds of high quality. The use of flange rolled bottom and deck edges with a 1½" straight flange keeps the joining weld seam out of the knuckle radius, providing maximum strength at all points throughout the tank.

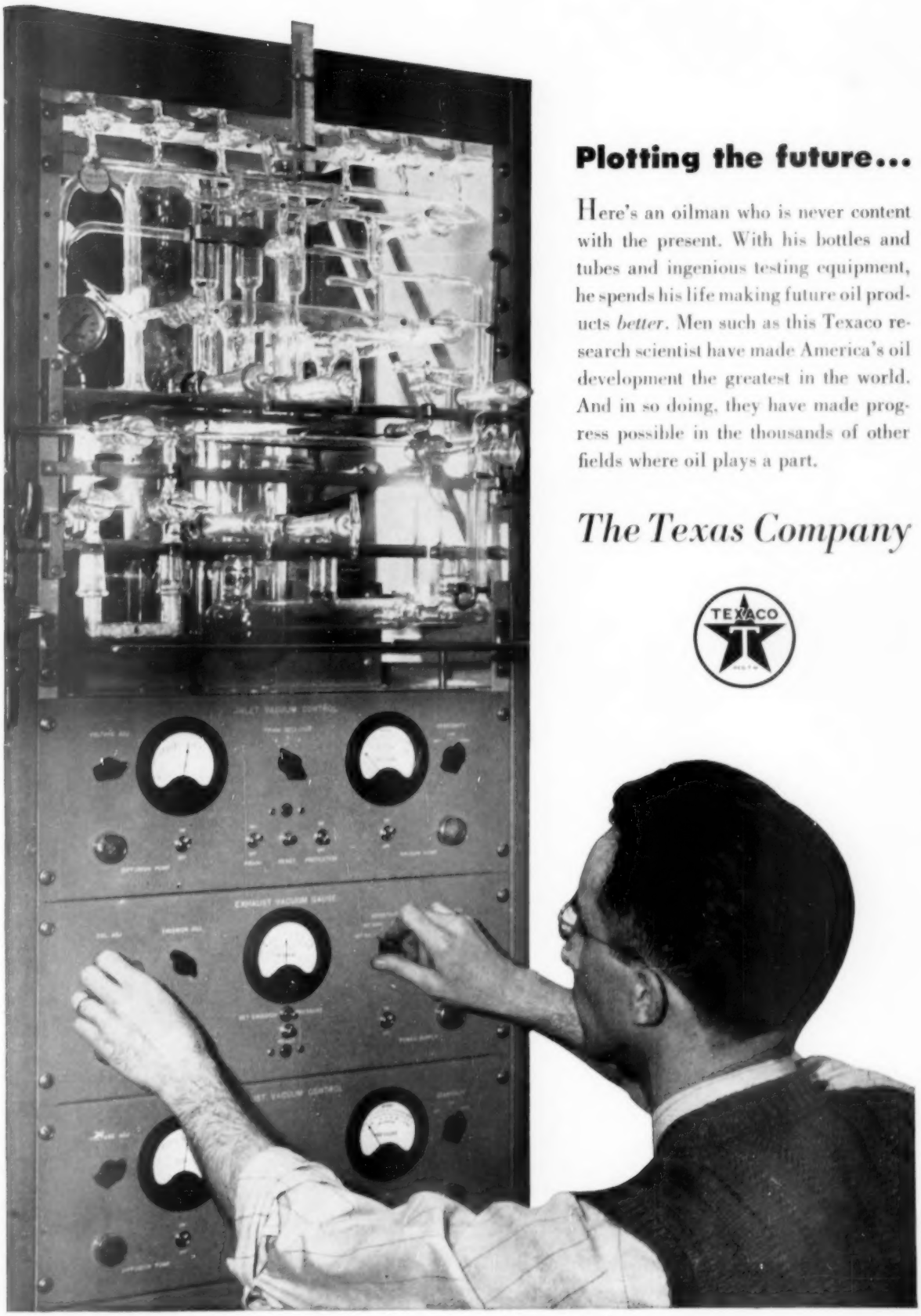
All couplings are heavy recessed, and have full fillet welds on both sides of the tank—except for deck couplings which have welding on the outside of the tank only. All tanks are completely air tested for leaks in the field. Elimination of all leaks and seepage by full penetration weld seams insures a safer installation—and one which will result in more net salable volume of product.

Call your BS&B Representative today—or write for complete information!

**BLACK, SIVALLS & BRYSON, INC.**
Oil & Gas Equipment Division, Dept. 1-A6
1708 West Main Street — Oklahoma City, Oklahoma

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY





## Plotting the future...

Here's an oilman who is never content with the present. With his bottles and tubes and ingenious testing equipment, he spends his life making future oil products *better*. Men such as this Texaco research scientist have made America's oil development the greatest in the world. And in so doing, they have made progress possible in the thousands of other fields where oil plays a part.

*The Texas Company*

TEXACO

# *Depend on* LADISH

## To Meet All Your Fittings Needs With an Unsurpassed Range of Sizes and Materials

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TO MARK PROGRESS

1 BUTT WELDING FITTINGS

2 A.S.A. FORGED FLANGES

3 FORGED SCREWED OR SOCKET WELDING FITTINGS

4 T.E.M.A. HUB & RING FLANGES

5 LONG WELDING NECKS

6 LARGE DIAMETER FLANGES AND RINGS

Available in...

# Complete Service . . .

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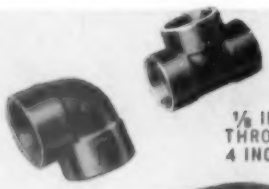
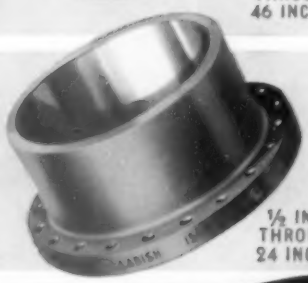
½ INCH THROUGH 24 INCHES



⅛ INCH THROUGH 4 INCHES

6 INCHES THROUGH 46 INCHES



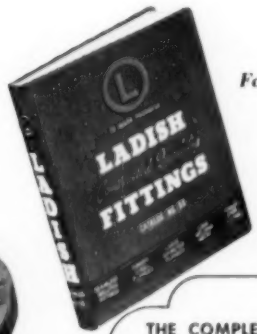
½ INCH THROUGH 24 INCHES

UP THROUGH 20 FEET O.D.

**CARBON, STAINLESS AND ALLOY STEELS, ALUMINUM, NICKEL AND OTHER FERROUS AND NON-FERROUS METALS**

## To Meet Your Entire Fittings Needs with a Line Complete In All 6 Major Types

For dependable service that results from an ideal combination of broad line and ample stock . . . specify and buy LADISH . . . the Controlled Quality line that offers a complete range of sizes, types, weights, pressure ratings and materials needed for virtually any piping installation. Your local Ladish distributor's ample stock is backed by complete factory inventories to keep your piping jobs on schedule. So, for *complete service* in fittings . . . specify and buy LADISH.




*For your new 304-page Ladish Fittings Catalog, No. 55 contact your Authorized Ladish Distributor, your local Ladish District Office, or write to Ladish Co., Dept. OGJ, Cudahy, Wis.*

THE COMPLETE *Controlled Quality* FITTINGS LINE
PRODUCED TO ONE STANDARD OF UNSURPASSED QUALITY

**LADISH CO.**

CUDAHY, WISCONSIN
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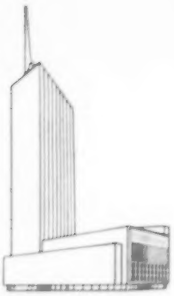


***What does it take to build an "Oil Bank"?***

## CALCULATIONS

Accurate interpretations of facts and figures is the business of Republic's staff of petroleum engineers. This is the foundation of *complete* oil financing service.

## CHRISTMAS TREES

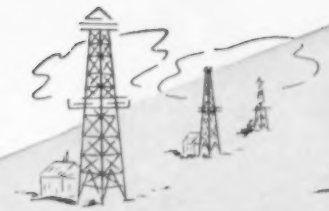
. . . the complex of valves that controls the flow of oil into Texas' economy. Helping to keep them backlogged with work is what it takes to make an "Oil Bank".

*This is your Republic!*

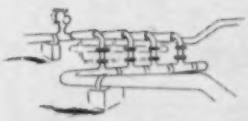
**REPUBLIC**
**NATIONAL BANK of Dallas**

*MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION*

*CAPITAL AND SURPLUS $50,000,000*
*LARGEST IN THE SOUTH*



at the wells . . .

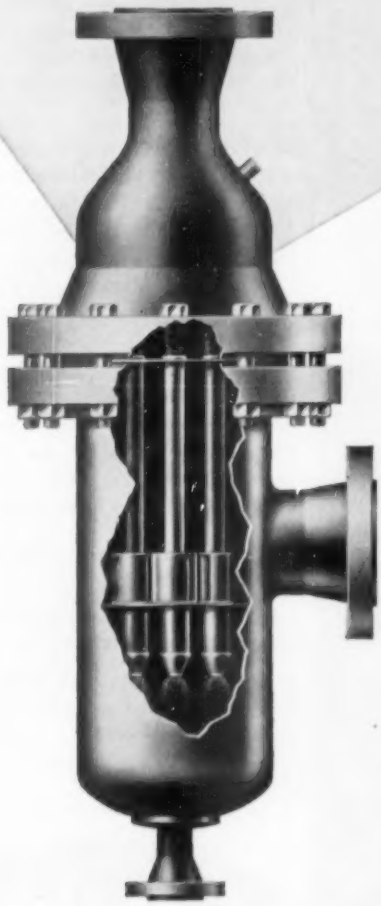


in the pipelines . . .

# DRY GAS SCRUBBERS

## assure you efficient natural gas cleaning

## *without liquid filters*



Aerotec Dry Gas Scrubbers offer you a highly efficient means of removing dusts and distillates from gas. In the "Big Inch" and many other installations at wells and in pipelines, these units are daily proving the advantages of *dry* scrubbing.

The Aerotec Gas Scrubber uses no oil or other liquid as a filtering medium. This eliminates carryover and other normal disadvantages of conventional type scrubbers. By keeping the gas clean and dry, Aerotec units help prolong the life of compressors and reduce pipeline maintenance.

Aerotec precipitating tubes are the heart of this dry scrubber. Gas passes through these multiple, small-diameter tubes, and the foreign matter is separated from the gas by centrifugal force. Discharge is continuous.

Space-saving compactness, light weight, and piping simplicity of the Aerotec Dry Gas Scrubber permit easy installation. The standard units are available in practically any size up to 100,000,000 SCFD. Manifolding meets needs for larger capacities. Our representative will gladly recommend the Aerotec Scrubbers your specific gas-cleaning problem requires. Call or write today.

*Project Engineers* **THE THERMIX CORPORATION** Greenwich, Conn.

*(Offices in 38 Principal Cities)*

*Canadian Affiliates:* **T. C. CHOWN, Ltd., Montreal 25, Quebec; Toronto 5, Ontario**

*Manufacturers*

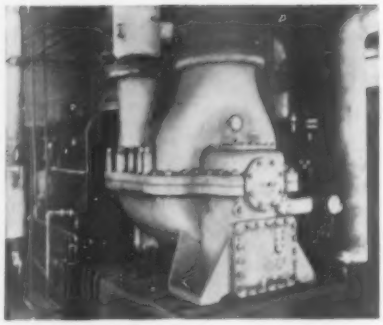
# THE AEROTEC CORPORATION

GREENWICH, CONN.



(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

# Carrier Centrifugal Compressors



on the job at

**The Texas Company**

*This Carrier Centrifugal Compressor is one of two on the job at the Casper, Wyoming, fluid catalytic cracking unit of The Texas Company. The Texas Company has installed 14 other Carrier units at five other plants.*

Carrier makes a complete line of centrifugals for air and gas compression and for refrigeration—up to 10,000 hp in a single unit. There are hundreds of these dependable, efficient Carrier machines on the job at dozens of chemical plants and oil refineries across the country—serving such companies as The Atlantic Refining Company, Tennessee Eastman Company, Sinclair Oil Corporation, Wyandotte Chemicals Corporation, Esso Standard Oil Company, Dow Chemical Company. May we assist *you?*

If you'd like a copy of our informative booklet,

**"Centrifugal Compressors for Industry"**

please call your nearest Carrier office. Or write direct to Carrier Corporation, Syracuse, New York.

Carrier

**centrifugal compressors**
**refrigerating equipment**

# They Say—

### The Works, Plus A Martini!

"The point to be made is that consciously or otherwise, the oil-chemist is being asked to provide a prescription lubricant to prop up the faults of a sloppy design. Certainly the situation would be better in all respects if we could make fewer varieties of lubricant in larger batches.

"There is no reason to continue expecting the oil-maker to not only provide cooling and lubrication for the bearing with his precious liquid, but also provide the engine with a cathartic, a headache powder, a skin treatment, and a Martini, all in a 45-cent package.

"Some day we might get the courage to tell the designer to fix his design instead of giving him the better treatment and asking for more trouble."

*R. J. S. Pigott, consulting engineer, former director of engineering research, Gulf Research & Development Co., in an address during the annual meeting in Pittsburgh of the Pennsylvania Grade Crude Oil Association.*

### You're So Right, Governor

"Think what a calamity we would have if all oil production stopped as of 5 o'clock this afternoon. This world couldn't exist without that valuable product. It is the one resource that drives the peacetime machinery."

*Gov. Dan Thornton of Colorado at a meeting in Denver of the Division of Marketing of the American Petroleum Institute.*

### Texas Gas Future Dim?

"This newspaper has been one of the few in Texas which has for years been viewing with alarm the rapidly accelerating pace at which natural gas is being siphoned out of Texas. . .

"Former State Senator C. C. Small . . . supports this view. He told an Associated Press writer that Texas cities may find themselves cut off from natural gas supplies while users in New York, California, and even Canada are still consuming Texas gas 12 years from now. . . There is even a more immediate threat than this—the proba-


NICHOLSON W. O. TRAPS

**Cannot Leak Live Steam**

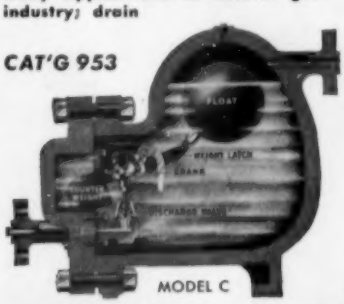
Even though re-evaporation completely dries up its body, a Nicholson weight-operated trap will not leak live steam. Widely used for steam purifiers, super-heated steam lines, headers, separators, heaters, etc.

DRAIN GASOLINE, WATER, OIL

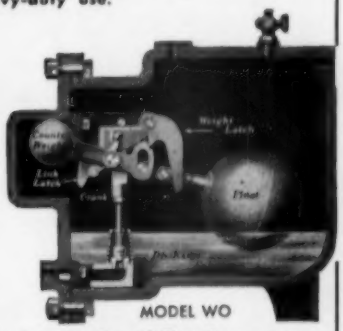
Nicholson W. O. traps also have many applications in natural gas industry; drain gasoline from scrubber head of booster and gas lift compressors; gasoline, oil or moisture from gas well separators, accumulators, after-absorbers, etc.; package natural gasoline plants; gas lines.

4 TYPES—press. to 200, 500, 650, 1500 lbs.; for every large-capacity, heavy-duty use.

CAT'G 953



MODEL C



MODEL WO

210 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

*for a cool, comfortable office*

**EMERSON-ELECTRIC**

ROOM AIR CONDITIONERS

You'll be cool and comfortable this summer with the finest air conditioning available when you depend on EMERSON-ELECTRIC room air conditioners. Compare them with any on the market and you'll find they have the same quality of design and construction that has made EMERSON-ELECTRIC the leader in the fan field for years.

PHONE 5-1241 TULSA

*When it's Electrical*

**NELSON**

ELECTRIC SUPPLY CO.

526 North Main • TULSA

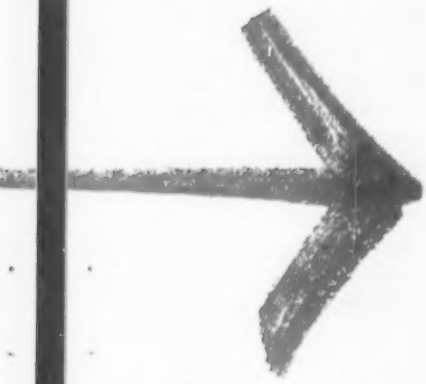



(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

# Where Mission makes the difference

You enjoy longer and lower slush pump valve costs today because a small replaceable Mission bushing multiplies valve seat life by as much as five times. Here's where this little bushing gets its start in your Mission Silver Top Valve's life . . . and here is where Mission begins to make the difference in your valve costs. This wear-taking Mission Bushing is carefully finished on the most modern machines to exact tolerances to insure that it fits perfectly in any Mission Silver Top Valve seat of the same size. Thus, you can have full confidence when you "change the bushing and save the seat" that your Mission Silver Top Slush Pump Valve will perform like new again. This means lower replacement costs and less time spent changing valve seats. And since the seat stays in the pump longer without removal, danger of washouts between the seat and deck is reduced. Always specify Mission Valves to your supply store so that you can be sure to take advantage of the difference that Mission makes in reduced valve costs, longer life and superior service.

*Nothing but the finest will ever bear the name of*



MISSION
MANUFACTURING CO.

P. O. BOX 4209 • HOUSTON, TEXAS

Export Office: 30 Rockefeller Plaza, New York

# Superior Quality

## costs no more

Price tags on tanks for liquefied petroleum gas and anhydrous ammonia are deceiving! All tanks may look alike, but there can be a tremendous difference in *quality*. The quality you must have for longer service life, for lower maintenance, for vital extra safety.

To give you that quality, A.C.F. not only x-ray inspects every inch of welded seam, but because of stresses set up by fusion welding, completely stress relieves the entire tank. Few manufacturers do this!

Such operations guarantee safety and provide the superior A.C.F. quality—yet the cost to the tank purchaser is comparable in price to the tanks that are not x-rayed or stress relieved.

These are just two of the reasons why A.C.F. tanks are unmatched for value! Why take unnecessary risks? Ask a courteous A.C.F. Representative for the complete facts today, or send for descriptive literature. American Car and Foundry Company, New York • Chicago St. Louis • Cleveland • Washington • Philadelphia San Francisco.

a.c.f. STORAGE TANKS • TRUCK TANKS • SAFETY VALVES

*Quality you can trust*

bility that the Federal Power Commission will move in and take charge of gas prices in Texas and other producing states to protect consumers in non-producing states. By failing to grant price fixing authority to the Texas Railroad Commission, the Texas legislature has left the door wide open to federal invasion and control. . ."

*From an editorial in the Abilene, Texas, Reporter-News.*

**High-Water Mark Will Fall**

"Perhaps 1954 won't be the boom year that 1953 was, but it will still be a very good year for business in general.

"It will be just about the second-best year our American business system ever has had. And, certainly, none of us here will say that 1953 will stand for very long as the high-water mark in our economy. It will be surpassed in time. From our national point of view, the best years are always ahead of us."

*T. S. Petersen, president of Standard Oil Co. of California, in an address during a meeting of the Division of Marketing of the American Petroleum Institute.*

**Thank You, Mr. Pound**

Sir:

I have read with interest your editorial in the May 3 issue of the Journal.

I want to compliment you on your excellent objective analysis of the market demand situation throughout the entire country.

Walker T. Pound
Director
Oklahoma Corporation Commission.

**Jet Fuel Forecast**

"Jet fuel requirements by the end of World War II were about 100 bbl. per day when this fuel was only used for experimental purposes. By fiscal year 1950 this increased to 11,000 bbl. per day, and by fiscal year 1953, to 81,000 bbl. per day, an increase of 600 per cent from fiscal year 1950.

"U. S. military jet fuel requirements are expected to continue this rapid ascent to about 240,000 bbl. per day in fiscal year 1956, an increase of 200 per cent over fiscal year 1953, or 2,000 per cent over fiscal year 1950. It is expected to level off at about 250,000 to 300,000 bbl. per day if the situation doesn't change materially.

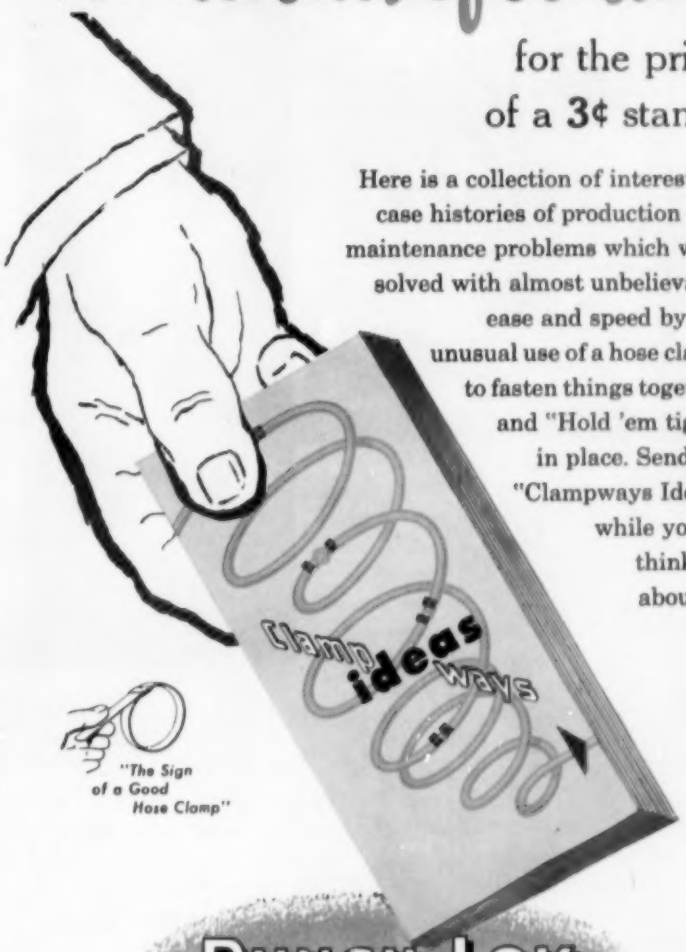
"Foreign jet requirements are about


**ideas**...worth

*hundreds of dollars*

for the price of a 3¢ stamp

Here is a collection of interesting case histories of production and maintenance problems which were solved with almost unbelievable ease and speed by the unusual use of a hose clamp to fasten things together and "Hold 'em tight" in place. Send for "Clampways Ideas" while you're thinking about it.




"The Sign of a Good Hose Clamp"

PUNCH-LOK Company

*...or get your copy from your near-by Punch-Lok Distributor.

Punch-Lok Company
Dept. M, 321 North Justine Street
Chicago 7, Illinois

send me Clampways ideas FREE

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My Name _____ Title _____

Address _____

City _____ State _____

4800




(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

# ±.0005" means longer pump life

The precision honing of D+B Hardened and Honed Barrel Tubes assures longer pump life . . . increased pumping efficiency. Accurately measured by a Precisionaire Gauge, each barrel tube is honed to a precision tolerance of ±.0005", thus permitting perfect fit of any tube and plunger of the same basic size.

Polished to a mirror-like finish, the working surface of D+B Hardened and Honed Barrel Tubes are free from all waves, scratches or other imperfections. The precision straightened tube and plunger materially reduce friction . . . thereby increasing pump life and lowering operational costs.

Strong and durable, D+B Hardened and Honed Barrel Tubes are made of high-grade seamless steel and are heat-treated and stress relieved by a specially developed process. For D+B sub-surface pumps or pump parts, call your nearest D+B or CONTINENTAL Supply Store.

D+B DIVISION
EMSCO MANUFACTURING COMPANY
Garland, Texas
LOS ANGELES, CALIF.
Houston, Texas

D+B
• DEEP WELL PUMPS
• SUCKER RODS
• COUPLINGS

CONTINENTAL
Serving the Oil and Gas Industries

THE CONTINENTAL SUPPLY COMPANY
General Offices: Dallas, Texas
Representatives in all principal oil fields of the world

E-170


50,000 bbl. per day and can be expected to increase to about 125,000 bbl. per day by 1960. This will bring total worldwide jet requirements from a current 200,000 bbl. to at least 400,000 bbl. per day by 1960. Again, I want to add—if the situation doesn't change materially."

*Col. J. H. Baughn of the Petroleum Logistics Division in a statement issued in Washington.*

**No Threat from Venezuela**

". . . Total exports of crude and oil products of Venezuelan origin to the United States last year were slightly reduced . . . there has been no tendency for Venezuelan oil to 'flood' the U. S. market. If increased imports into the U.S. are threatening the domestic industry, this threat, in our opinion, does not come from Venezuela . . .

"Continuation of oil imports from Venezuela, we feel, should be vigorously defended from the viewpoint of what is best for the U.S. as a whole . . . Whether or not there is too much oil being shipped into our country right now is highly debatable . . .

". . . Today, as our country once again faces an international situation fraught with grave consequences, it would seem to be the height of folly indeed to threaten or to impair our most immediate and our most dependable source of foreign oil."

*A. T. Proudfit, president of Creole Petroleum Corp., in an address to stockholders in New York.*

# CALENDAR OF EVENTS

JUNE

17-19 American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

17-19 National Oil Scouts and Landmen's Association, annual meeting, New Orleans.

20-24 Canadian Gas Association, Banff Springs Hotel, Banff, Alta., Canada

28

July 4 Seventh annual Conferences on Personnel Administration and Managerial Development, Industrial Relations Section of the California Institute of Technology, California Institute of Technology, Pasadena, Calif.

21-25 Gordon Research conferences, con-

When a prospective mud engineer joins the Magcobar staff, his school days are a long ways from being over.

In the extensive "Mud Doctor" training courses which Magcobar conducts regularly for its own personnel and those of oil companies, the student learns all that modern science knows about how to apply drilling mud knowledge to help oil operators drill better wells safely at lower costs.

Magcobar keeps its engineering service organization in tune with the needs of the industry. When you need help at your well, call your Magcobar engineer. He is ready day or night to help you meet any mud emergency.

**MAGNET COVE BARIUM CORPORATION**
HOUSTON, TEXAS
ONE OF THE DRESSER INDUSTRIES

Magcobar

**HERE'S WHERE WE ADD "MD" TO AN ENGINEERING DEGREE**



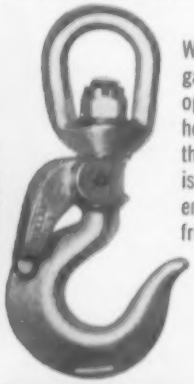
(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

## PROTECTION – WHERE ACCIDENTS BEGIN

## BULLARD-BURNHAM SAFETY HOOKS

*At last* a 100% safe hook for every type of equipment; utility and chain hoists, horizontal tuggers, come-a-longs, cranes, block and tackle or snatch blocks. Safety gate automatically locks closed and cannot be disengaged accidentally. A touch of the finger releases the lock to open gate. If the hook is sprung, even ¼ inch, gate will swing free, warning workers. All hooks used are standard drop forged hooks with B & B safety gates of non-corrosive brass. Sizes available #2 through #16A. Return spring on gate is available at additional cost. Write for descriptive circular.

E. D. BULLARD CO.
SINCE 1898
SAFETY HOOK DIVISION
275 EIGHTH STREET
SAN FRANCISCO 3, CALIF.



With gate open hook's throat is entirely free

EVERYTHING BULLARD IN SAFETY
T. M. REG. U. S. PAT. OFF.


ference on petroleum, Colby Junior College, New London, N. H.

24-25 Western Petroleum Refiners Association, regional meeting, Leonard refineries auditorium, Alma, Mich.

27

27

July 1 Petroleum Equipment Suppliers Association, Manoir Richelieu, Murray Bay, Quebec, Canada.

**JULY**

13-14 Western Plant Maintenance Conference, Ambassador Hotel, Los Angeles.

15 Southern Gas Association, conference on radio communications for pipelines, Adolphus Hotel, Dallas.

16 Southern Gas Association, dispatchers' conference, Adolphus Hotel, Dallas.

29-31 Wyoming Geological Association, ninth annual field conference, Casper, Wyo.

**AUGUST**

13 Southern Gas Association, conferences on pipeline operations and pipeline engineering, Rice Hotel, Houston.

16-18 Society of Automotive Engineers, West Coast annual meeting, Statler Hotel, Los Angeles.

20 Southern Gas Association, conferences on natural-gas gathering and natural-gas processing, Captain Shreve Hotel, Shreveport.

23-25 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

26-28 (tentative) Intermountain Association of Petroleum Geologists, fifth annual field conference, beginning at Price, Utah.

**SEPTEMBER**

7-9 Association of Desk and Derrick Clubs of North America, annual convention, Banff Springs Hotel, Banff, Alta.

8-10 Pacific Coast Gas Association, sixty-first annual meeting, Vancouver Hotel, Vancouver, B. C.

9-11 Interstate Oil Compact Commission, Omaha, Neb.

10 Southern Gas Association, conference on compressor-station operation, Jung Hotel, New Orleans.

12-16 American Institute of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.

13-14 Independent Natural Gas Association of America, annual meeting, Roosevelt Hotel, New Orleans.

15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.

16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

23-24 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.

27-28 Symposium on Methods for Testing Liquefied Petroleum Gases (ASTM D-2; ASTM D-3, CNGA & NGAA), Statler Hotel, St. Louis.

27-29 Electrical Conference for Petroleum Industry, American Institute of Electrical Engineers, Mayo Hotel, Tulsa.

27-30 Ninth Annual Petroleum Mechanical Engineering Conference, petroleum division of the American Society of Mechanical Engineers, Statler Hotel, Los Angeles.

28-29 Texas Mid-Continent Oil and Gas Association, Baker Hotel, Dallas, Tex.

30 Southern Gas Assoication, conference on transmission management, Shamrock Hotel, Houston.

**OCTOBER**

1 Southern Gas Association, conference on gas pipeline rights-of-way, Rice Hotel, Houston.

3-7 ASTM Committee D-2 on Petroleum Products and Lubricants, Sheraton Park Hotel, Washington, D. C.

4-6 Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.

4-6 Petroleum Electric Power Association, twenty-sixth anniversary meeting, Jung Hotel, New Orleans.

6-8 Eighteenth Technical Conference on Petroleum Production, Pennsylvania State University, State College, Pa.

7-8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.

7-8 American Institute of Mining and Mettallurgical Engineers, Pacific Petroleum chapter, fall meeting, Biltmore Hotel, Los Angeles.

11-13 American Gas Association, annual convention, Atlantic City, N. J.

11-13 American Association of Oilwell Drilling Contractors, annual meeting, Biltmore Hotel, Los Angeles.

12-15 Eighth National Chemical Exposition Chicago Coliseum, Chicago.

14-17 Permian Basin Oil Show, Odessa, Tex.

17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.

21-22 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.

24-26 Independent Petroleum Association of America, annual membership meeting Mayo Hotel, Tulsa.

25-27 National Lubricating Grease Institute, annual meeting, Mark Hopkins Hotel, San Francisco.

26-27 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.

**NOVEMBER**

1-3 Geological Society of America, annual meeting, Statler Hotel, Los Angeles.

3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.

4-5 Society of Automotive Engineers, national fuels and lubricants meeting Mayo Hotel, Tulsa.

5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.

8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

11-12 American Association of Petroleum Geologists, Pacific section annual meeting, Biltmore Hotel, Los Angeles.

17-18 North Texas Section, American Institute of Mining and Metallurgical Engineers, and Production Committee of the North Texas Oil and Gas Association, symposium on secondary recovery, Wichita Falls, Tex.

28-Dec. 3 American Society of Mechanical Engineers, Statler Hotel, New York

**DECEMBER**

2-4 Interstate Oil Compact Commission winter meeting, Drake Hotel, Chicago

2-4 American Chemical Society, Southwest Regional meeting, Fort Worth, Tex.

12-15 American Institute of Chemical Engineers, annual meeting, Statler Hotel, New York.

Yours
. . . for the asking.
FIRST QUALITY
OPTIMUM SILENCING
Best Grade of Silencing Available!
BURGESS-MANNING COMPANY
FIRST QUALITY
STANDARD SILENCING
. . . for All but most Critical Locations!
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New Engineering Data Catalog on
BURGESS-MANNING
Explosion Resistant
SNUBBERS
For:
ENGINES • PUMPS
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Three Grades of Silencing . . . with ONE GRADE of quality—the FINEST! Burgess-Manning Snubbers offer these features in ALL THREE SERIES!
EFFICIENT MECHANICAL DESIGN—the result of over a quarter century of solving surge and noise problems.
PROVEN PRINCIPLES—perfected through sustained research.
BUILT LIKE PRESSURE VESSELS—explosion-resistant . . . rugged . . . trouble-free.
FLEXIBILITY OF INSTALLATION—inlet types to fit any condition with the greatest possible efficiency and economy.
Send for NEW ENGINEERING DATA CATALOG TODAY.
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COMMERCIAL SILENCING
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*Profit-building* **answers** *to* ***MODERN***

*results of*

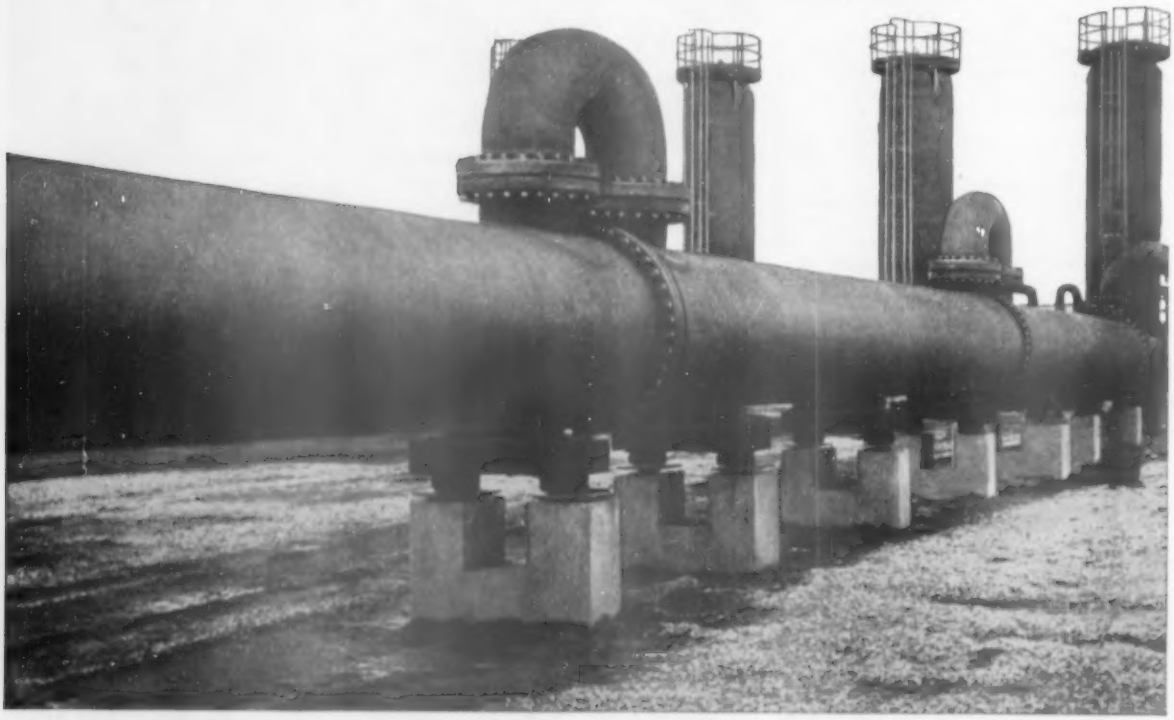
## Alco EXPERIENCE

...gained through many years of designing and building heavy-metal equipment for refining and processing companies the world over.

*and*

## Alco FACILITIES

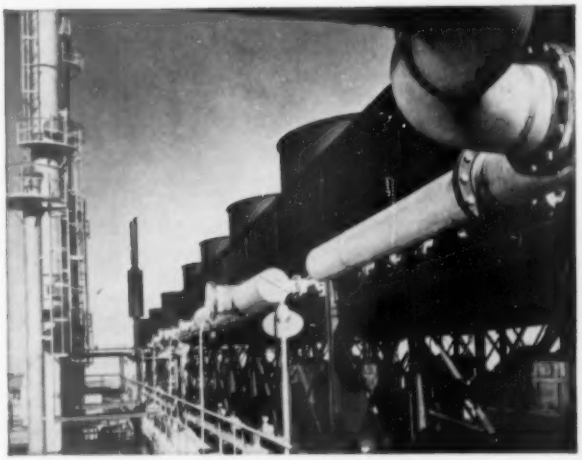
...capable of handling economically an extremely wide range of metal-fabricating operations...of meeting strictest customer specifications.



**150 FT "TRAIN" HEAT EXCHANGERS,** designed and built by Alco with special flange-to-flange construction, step up efficiency at Tennessee Gas Transmission Company's huge gas processing plant at Gabe, Kentucky. Other Alco units at Gabe include ethylene flash drum, demethanizer tower, primary feed cooler.

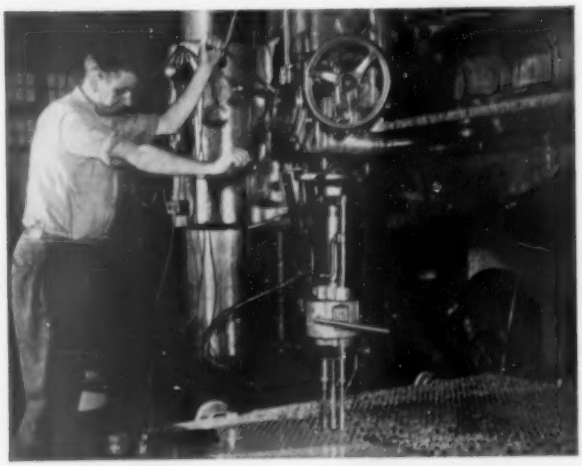
# *PROCESSING problems*

...examples of the wide variety of heavy-metal equipment designed and built by Alco to meet today's demands in petroleum and petrochemical processing.



**SPECIAL ALCO AIRCOOLERS,** with many components of aluminum and stainless steel, handle 80 percent of cooling load at Celanese Corporation's new 630-acre petrochemical plant at Pampa, Texas. Units have removable headers and slide-out tube bundles, operate in constant presence of highly corrosive acids, chemicals and gases.

**PRIMARY AND ATMOSPHERIC TOWER CONDENSERS,** plus stabilizer condenser, naphtha cooler, kerosene and diesel oil exchangers, are among the many Alco units at Canadian Oil Refineries' new $23,000,000 plant at Sarnia, Ontario. This plant produces more than 115,000,000 gal. of gasoline annually, claims first catalytic reformer in Canada.



**EIGHT FOOT RADIAL DRILL** at Alco's modern, completely equipped plant at Dunkirk, N.Y., has multiple head for the precision drilling or reaming of several holes simultaneously. Unique facilities like this, many of them Alco designed, enable Alco to fabricate dependable, profit-building answers to toughest processing problems.

Let Alco facilities and experience produce profit-building answers to *your* processing problems. Contact your nearest Alco Products sales representative today. Offices in Dunkirk, New York, Chicago, Los Angeles, Kansas City, Houston, Tulsa and Beaumont.

**ALCO**
**PRODUCTS**

**AMERICAN LOCOMOTIVE COMPANY**

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Kobe for Better Pumping
Centralized Hydraulic power helps make KOBE Free Pumping Systems the most economical pumping method in use today. Join the hundreds of profit-minded Free Pump users. Investigate KOBE Free Pumping today.
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THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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•

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# JOURNALLY Speaking

## Harvard vs. Spindletop

READERS always delight in pointing out a mistake by an author, but when the author is also a Harvard man—boy, oh, boy, do they heap up their scorn.

We have just received a note from an anonymous Texan headed "Oil History a la Hah-vahd." All it contains is a short quotation from a 700-page book on "The Growth of Integrated Oil Companies" by two Harvard professors. But this Texan's silent scorn is more eloquent than words.

The quoted paragraph tells how Capt. Anthony F. Lucas, preparing to drill what became the discovery well at fabulous Spindletop field near Beaumont in 1900, enlisted the aid of the famous Pittsburgh wildcatters, Guffey and Galey, who in turn obtained financing to the tune of $300,000 from the Mellon banking interests. The incident was related simply to tell how Gulf Oil Corp. got started, but the Harvard researchers made what, to a Texas oil man, was a fatal slip when they wrote:

"The purpose of the $300,000 loan from the Mellons was to finance construction of the rotary rig. This rig was referred to by the natives of Beaumont as a 'spindletop' and the field thus became known by that name."

That might sound logical to a Harvard man, but it doesn't jibe with any of the other stories we have heard about the origin of that field name. In the first place, it doesn't cost any $300,000 to build the kind of rotary rig used in 1900 (though a big modern rig may cost that much in present-day dollars). Lucas' drilling contractors, the Hamill brothers, moved in a rotary they had been using for some time in developing the oil field at Corsicana, Tex. Rotaries also had been used in drilling for salt in nearby Louisiana, and one of the earlier shallow dry holes at Spindletop had been drilled by a light rotary. So rotaries weren't a complete novelty.

Furthermore, "spindletop" seems too effete a term to have been coined by early-day oil men who referred to cable-tool operators as "jar-heads" and rotary drillers as "swivel-necks."

All the books and articles we have read suggest that Spindletop may not have been the official name of the mound on which oil was discovered before the field was brought in. The low hill, rising only some 15 ft. above the utterly flat terrain around Beaumont, was locally known as Round Top Mound, Sour Spring Mound, or just "the hill." But . . . the sulfur springs at its base were called Spindletop Springs. And part of Lucas' lease was under a real-estate development known as Spindletop Heights.

So where did the name come from? Well, 3 years ago our own "Golden Annie," published to commemorate the golden anniversary of both the oil industry in the Southwest and The Oil and Gas Journal, said that the hill was so named by boatmen on the Sabine River because of a lone scraggly pine tree, shaped something like the spindle of a spinning wheel, which served them as a landmark and an aid to navigation.

And until something more authoritative than the surmises of two Harvard professors comes along, that's the version we're going to stick with.

## Lion's Checks

WHEN Lion Oil Co. checked up on its 1953 income and outgo, it looked for a simple way of explaining the figures to its employes and stockholders. It solved the problem neatly by issuing them checkbooks. They looked like real checkbooks, only each check was already made out and marked "Paid." Sample: "Pay to the order of . . . Suppliers of Materials and Services . . . $44,032,582." This particular check, incidentally, depleted Lion's 1953 deposits by almost exactly 50 per cent.

The checks weren't any good in the usual sense, but they were a very good check on where the money went. Fortunately, none of Lion's checks was marked "N.S.F."

*—Henry D. Ralph.*

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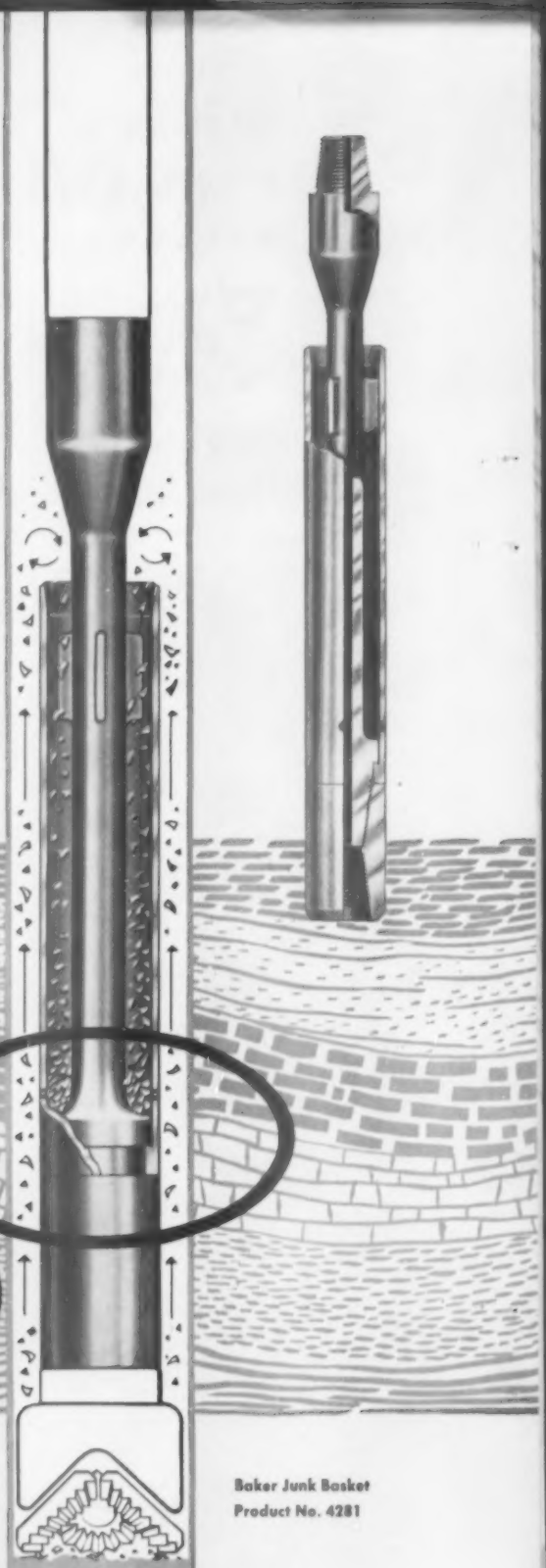

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# Federal control is here; let's cope with it calmly

THE constitution, said the late Charles Evans Hughes, is what the Supreme Court says it is. Likewise, what Congress did is what the Supreme Court says it intended to do.

Now the Supreme Court says that in passing the Natural Gas Act, Congress intended to regulate sales of gas which eventually moves into interstate commerce—despite a considerable volume of opinion that Congress intended to do just the opposite.

So be it. That's the law of the land, and only Congress can change it. Congress will be asked to change it, but there is no assurance that a change will be made for months, perhaps years.

IN THE MEANTIME, gas producers and the Federal Power Commission must live in the same tent. Now is no time for railing and diatribes; the two have a big problem to work out together.

Unless and until events indicate otherwise, it may be assumed that the FPC is not approaching this problem in the spirit of a vindictive victor toward a rascally enemy. Rather, it is dutifully undertaking an unwanted assignment and is preparing to make the best of it. It will need help.

Gas producers and processors may—and should—use every available legal means to escape or temper the impending regulation. But it will be to their advantage if, at the same time, they also work with the commission in groping for workable solutions to common problems.

The Power Commission is at least half sold on the idea that public-utility type of rate-making regulation of producers is neither necessary nor desirable for the protection of gas consumers, that it would be a Herculean and frustrating administrative task, and that it could wreak havoc with the entire oil and gas producing industry.

IF PRODUCERS CAN, in good faith, demonstrate this, they may have FPC as a powerful ally in seeking legislative relief from Congress, whereas an attitude of recalcitrance could lose them many supporters.

On the other hand, Congress may refuse to amend the law, leaving producers permanently under FPC's control. In that event a relationship of "friendly enemies" will be a far sounder foundation for future dealings than a history of bickering and hatred.

Chaos would reign throughout the oil and gas industry if the full force of FPC's powers were imposed on all producers simultaneously. The commission knows this. So it will proceed case by case, seeking advice and feeling for practical solutions.

By acting like "His Majesty's loyal opposition," the industry can enlist the help of FPC in finding a way out of what today looks like a hopeless predicament.

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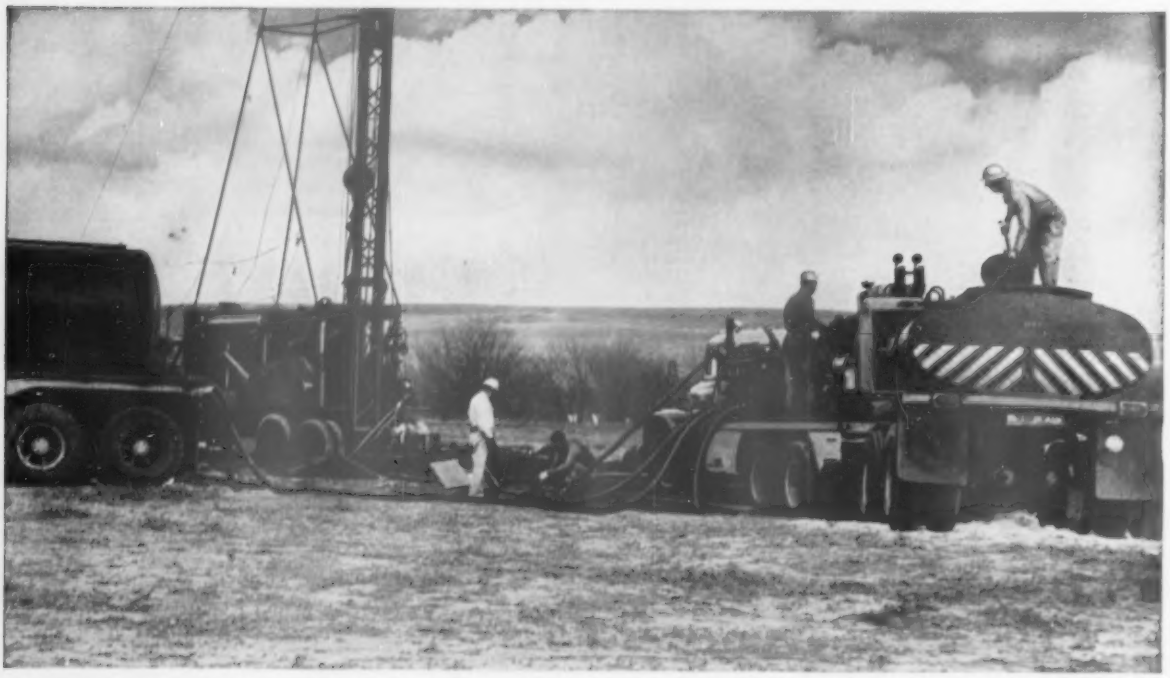

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Dowell engineers furnish all materials and especially designed, high-pressure pumping equipment. Their experience on thousands of these jobs helps assure you of dependable service.

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# THIS WEEK . . . . . IN THE NEWS

**NATURAL GAS**—Supreme Court ruling that FPC has jurisdiction over Phillips Petroleum's sales of gas in interstate commerce seen as bringing roughly 2,300 independent producers under government control. . . . Practical outlook, however, is that years may elapse before regulation is extended far into gas industry. . . . Meanwhile, congressional action could nullify court ruling. . . . Even without this, FPC is expected to move slowly and, too, legal maneuvering could result in lengthy delays. . . . ¶FPC policy of considering field prices in determining rates of pipeline companies goes into effect as it dismisses requests for a rehearing of the Panhandle Eastern case. . . . New policy replaces that of using cost-of-acquisition basis in determining value for rate-making purposes. . . .

**INTERNATIONAL** — World's largest tanker launched in Germany. . . . Ship, owned by A. S. Onassis, will haul Saudi Arabian crude oil under an unusual agreement with Saudi Arabian Government. . . . State Department protests tanker agreement as violation of concession terms with Arabian American. . . . ¶Top executives of oil consortium confer in London in effort to draft compromise to Iran's objection to proposed plan for settling oil-nationization. . . . Serious differences still remain. . . . ¶International Bank approves $14,000,000 loan for construction of 350-mile line to provide outlet for natural gas in West Pakistan's Sui field. . . .

**JUST FINISHED is the 462-mile products line of Oklahoma Mississippi River Products Line, Inc., which runs from the Duncan, Okla., refinery of Sunray Oil Corp., to a terminal on the Mississippi at West Memphis, Ark. Last joint in the line was welded last week. This crossing of the Arkansas River required 2,000 ft. of deep ditching, part as a protection against future shifts of the river channel. In the background is the old channel, where the company ditched to a depth 8 ft. below the bottom of the channel, foreground, with the thought that the river might some day return and threaten the crossing. For a story on the line, see page 107.**

**EXPLORATION**—Reports of seismic survey of Long Beach oil prospects indicate city's productive area may be much larger than believed previously. . . . Report warns, however, that draining reservoirs beneath city's business and residential districts will carry risk of subsidence. . . . ¶Shell installs pump on Nevada test, indicating well is about to become producer and give country a new oil state. . . . ¶Monterey Oil's test from man-made drilling island off Seal Beach is drilling below 4,000 ft. . . . Classed as an exploratory hole, the well is located only 600 ft. from a 12,500-ft. well completed in 1947 from an upland site. . . . ¶Rain and mud slow drilling activity in western Canada. . . . Six Imperial tests in Pembina area pass pay zone, but findings are secret. . . .

**IMPORTS**—I.P.A.A. discloses it will ask Congress to set a ceiling of 800,000 bbl. daily on imports of foreign oil. . . . Executive and import-policy committees vote to seek flexible tariff as a means of holding down flow without endangering security or reciprocal-trade arrangements. . . . ¶Atlantic Refining joins three earlier companies in announcing it will cut imports over rest of year. . . . Atlantic plans cut of 6,500 bbl. daily, or 10 per cent. . . . Sun Oil Co., however, announces it will begin importing about 7,500 bbl. daily for its Marcus Hook refinery. . . .

**OFFSHORE**—Magnolia plans to test its expensive offshore Texas lease block by late July or early August. . . . Company paid $4,500,000 to Texas for 11,520-acre lease 8 miles offshore from Jefferson County last December. . . . ¶Sinclair, as operator, lets contract for first well to test 2,018-acre lease on southwest flank of Timbalier Bay field. . . . Sinclair and three other companies in joint venture paid $3,127,668 to Louisiana for leases in April. . . .

**PIPELINE**—Sinclair and Pure plan $25 million expansion and modernization of system through western Kansas to Denver-Julesburg basin. . . . Enlarged system will extend 494 miles before connection with Sinclair's "Big Inch." . . . Construction to start in early 1955. . . . ¶Construction started on Wyoming-Nebraska's 220-mile, 6-in. products line from Cheyenne to North Platte. . . . ¶Barge operators seek injunction against Texas Eastern and affiliates. . . . Pipelines accused of seeking monopoly. . . .

# Gas Control Expanded

## Supreme Court rules FPC has control over interstate gas sales of Phillips; far-reaching effects seen in opinion

**Bertram F. Linz**

WASHINGTON.—The Supreme Court last week opened up a new broad segment of the natural-gas industry to Federal Power Commission control.

In a 5-to-3 opinion, with Justice Robert H. Jackson not participating, the court affirmed a decision of the District of Columbia Court of Appeals holding that Phillips Petroleum Co. is a natural-gas company subject to FPC jurisdiction so far as its interstate gas sales are concerned.

The decision puts the sales to interstate pipeline companies of some 2,300 independent producers under federal regulation—in theory, at least.

The court's decision was not unexpected in view of its opinion February 8 invalidating the Texas gas-gathering tax on the ground that at the point at which it was levied the gas was already in interstate commerce. The tax was levied at the outlet from Phillips' processing plant, where the gas is sold and delivered to an interstate pipeline company. At that point, the court majority held last week, Phillips is subject to FPC jurisdiction.

Delivering the court opinion, Justice Sherman Minton dismissed the contention that the sales by Phillips are a part of the production or gathering to which the commission's jurisdiction expressly does not extend under the Natural Gas Act.

**Court's ruling . . .** "In our view," Minton said, "the statutory language, the pertinent legislative history, and the past decisions of this court all support the conclusion of the Court of Appeals that Phillips is a 'natural-gas company' within the meaning of that term as defined in the Natural Gas Act, and that its sales in interstate commerce of natural gas for resale are subject to the jurisdiction of and regulation by the Federal Power Commission."

Minton referred to previous Supreme Court decisions in cases involving the Panhandle Eastern Pipe Line Co., Colorado Interstate Gas Co., Interstate Natural Gas Co. and others, which he said "supply a ready answer to the determination of the commission and also to petitioners' suggestion that 'producing or gathering' should be construed to mean the 'business' of production and gathering, with the sale of the product considered as an integral part of such 'business.' We see no reason to depart from our previous decisions, especially since they are consistent with the language and legislative history of the Natural Gas Act.

"In general," Minton continued, "petitioners contend that Congress intended to regulate only the interstate pipeline companies since certain alleged excesses of those companies were the evil which brought about the legislation. If such were the case, we have difficulty in perceiving why the commission's jurisdiction over the transportation or sale for resale in interstate commerce of natural gas is granted in the disjunctive. It would have sufficed to give the commission jurisdiction over only those natural-gas companies engaged in 'transportation' or 'transportation and sale for resale' in interstate commerce if only interstate pipeline companies were intended to be covered."

### Journal Honored Ninth Time

**The Oil and Gas Journal has been presented a 1953 award for editorial excellence by Industrial Marketing, an advertising and graphic arts magazine that annually conducts the competition among the nation's leading business publications. The Journal has won awards nine consecutive years. The 1953 award was presented for "outstanding original research" in the coverage of the world-wide petroleum situation in the Journal's annual international issue, which was published last year on December 21. The Journal's peak award-winning year was 1951, when the Journal won three awards—one for an outstanding single article, another for a single issue, and a third for a series of articles.**

**Cites legislative action . . .** The legislative history, Minton asserted, "indicates a congressional intent to give the commission jurisdiction over the rates of all wholesales of natural gas in interstate commerce, whether by a pipeline company or not, and whether occurring before, during, or after transmission by an interstate pipeline company."

Minton explained the purpose of the act was to plug a gap in the regulation of natural-gas companies resulting from judicial decisions prohibiting, on constitutional grounds, state regulation of many of the interstate commerce aspects of the natural-gas business.

"Regulation of the sales in interstate commerce for resale made by a so-called independent natural-gas producer is not essentially different from regulation of such sales when made by an affiliate of an interstate pipeline company," Minton concluded. "In both cases, the rates charged may have a direct and substantial effect on the price paid by the ultimate consumers. Protection of consumers against exploitation at the hands of natural-gas companies was the primary aim of the Natural Gas Act. Attempts to weaken this protection by amendatory legislation exempting independent natural-gas producers from federal regulation have repeatedly failed, and we refuse to achieve the same result by a strained interpretation of the existing statutory language."

**Two dissents . . .** In two separate dissents, Justices William O. Douglas, Tom C. Clark, and Harold H. Burton held that Congress had never included control over production and gathering among the powers it gave the FPC in the Natural Gas Act.

**First dissent . . .** Douglas said if the court gives the FPC authority over Phillips' sales it largely nullifies the exemption granted by Congress.

"If Phillips' sales can be regulated, then the commission can set a rate base for Phillips," Douglas pointed out. "A rate base for Phillips must of necessity include all of Phillips' producing and gathering properties, and supervision over its operating expenses necessarily

includes supervision over its producing and gathering expenses."

"The price at which the independent producer can sell his gas determines the price he is able or willing to pay for it (if he buys from other wells)," Douglas continued. "The sales price determines his profits. And his profits, and the profits of all the other gatherers, whose gas moves into the interstate pipelines, have profound effects on the rate of production, the methods of production, the old wells that are continued in production, the new ones explored, etc.

"Regulating the price at which the independent producer can sell his gas regulates his business in the most vital way any business can be regulated."

**Second dissent . . .** In the second dissent, with Burton concurring, Clark held that the court's decision restricts the phrase "production and gathering" to "the physical activities, facilities and properties" used in production and gathering, and if that is what Congress intended, "then it left for state regulation only a mass of empty pipe, vacant processing plants and thousands of hollow wells with scarecrow derricks, monuments to this new extension of federal power."

"There can be no doubt," Clark warned, "as the commission has found, that federal regulation of production and gathering will collide and substantially interfere with and hinder the enforcement of these state regulatory measures . . ."

"Even a cursory examination of Phillips' operations reveals how completely local they are and how incidental to them are its sales to the pipelines. Moreover, federal regulation of these sales means an inevitable clash with a complex of state regulatory action, including minimum pricing."

The issue of federal control of production and gathering has been batted back and forth for years in the FPC, Congress, and the courts. Congress in 1950 passed legislation specifically exempting production and gathering from federal control, but the measure was vetoed by former President Truman.

**Case background . . .** The Phillips case, itself, had its genesis in an FPC investigation of its prices initiated in 1948. In 1951, the commission held, 4-to-1, it had no jurisdiction over Phillips' gas sales and dismissed the case, but the State of Wisconsin and the cities of Milwaukee, Detroit, and Kansas City contested that decision in the Court of Appeals. That court, by 2-to-1, reversed the FPC last year.

Phillips, the commission, and the State of Texas appealed the court's decision. The Supreme Court, without hearing, declined to review the case last November 30, but later reversed itself and accepted the suit.

## Industry Asks: What's Next? . . .

# . . . FPC Expected to Move Slowly

**Henry D. Ralph**

THE reaction of oil and gas producers to the Supreme Court's decision in the Phillips case was one of stunned perplexity.

"What do we do now?" was the question generally asked.

The decision was not a complete surprise, but the industry had clung to hopes that the high court, on fuller consideration than the subject has ever had before, would reverse the trend toward extension of federal control into gas production which has been so apparent for several years.

Now that the decision is clear and final—with no further recourse except to Congress—operators have a fairly good understanding of what will happen when the Federal Power Commission gets around to classifying them, individually, as "natural gas companies" and regulating them like a public utility.

*(The nature of the regulation in prospect, together with a brief history of the Phillips case, was sketched in The Oil and Gas Journal, December 7, 1953, pages 68-70.)*

The questions of the moment are: "When will a particular producing operation be affected?" and "Is there any way out?"

**Little is certain . . .** The only sure and complete way out, of course, is congressional legislation writing into the Natural Gas Act an explicit exemption for producers and gatherers—one that the courts can't misconstrue a second time.

But that may be difficult to achieve in the immediate future. In the meantime, no producer or natural-gasoline plant needs to do anything sudden or drastic.

In the first place, the Supreme Court's decision is not a regulation, imposed like a blanket on all suppliers of gas. Only time will tell whether it eventually works out that way. It sets a pattern, true, but at the moment it applies only to certain specified sales by a single company.

How the pattern unfolds will depend, first, on what develops as the FPC moves to apply its newly affirmed jurisdiction to individual gas operations of Phillips Petroleum Co.—and this may be a long-drawn-out process. After that the pattern will be shaped by what happens as attempts are made to impose regulation on other suppliers, and these may be taken up one or two at a time as individual cases.

This process of extending regulation will permit many "delaying actions," and may open up several possible avenues of complete or partial escape. In turn, such events could either dramatize the necessity for legislative action, or soften the blow in case Congress fails to act.

**First comes Phillips . . .** So far nobody has done anything to Phillips except to say that it is legally a "natural gas company" and therefore subject to FPC regulation because it is a producer and gatherer of natural gas which later moves in interstate commerce.

The next step is for FPC to order Phillips to file with it the contracts under which it sells gas from certain specified gasoline plants to certain named interstate pipelines, particularly Michigan-Wisconsin Pipe Line Co. This order probably will come as soon as FPC receives the formal mandate from the court.

Then it's a safe bet that consuming interests along the Michigan-Wisconsin line—notably the cities of Milwaukee and Detroit—will pressure FPC to investigate the reasonableness of the sales prices. This could involve a long hearing on Phillips' accounting practices, operating costs, and investments in the producing, gathering, and processing facilities used specifically to supply the Michigan-Wisconsin line. Finally, FPC would decide that Phillips is entitled to a return of, say, 6 per cent on this investment and order its prices adjusted to fit this rate of return.

**Action may be slow . . .** All this will

take many months and won't directly affect any other gas producers nor any other Phillips operations.

In the meantime other consumers on other pipelines could make similar requests that FPC investigate the sales prices of other producers. In that way federal regulation will spread gradually, case by case. How far and how fast the procedure spreads will depend in large part on how much luck FPC has in reducing Phillips' charges to Michigan-Wisconsin.

If Phillips chooses to use every delaying and obstructionist tactic known to the legal and accounting professions, it might cool the ardor of those who want to rush into action against a host of independent producers all at once.

And, after all the costly legal battling, FPC might not cut Phillips' rates at all, or reduce them so slightly that other consumer interests would conclude that the game is not worth the candle.

**The "New" FPC . . .** A couple of years ago the FPC, as then constituted, would have taken a Supreme Court decision as an undisputed mandate to impose utility-type regulation on all gas producers just as rapidly as it could move into this field.

Today, however, most of the five commissioners (and some of the staff personnel) take a more realistic view and can be counted on to move slowly. Persons in close contact with the commission are confident that FPC has no plans to crack down on all producers immediately. Rather, it is anxious to find some way of avoiding the necessity for regulating them at all.

On the basis of public and private statements of FPC officials, it can be said that the prevailing attitude in the commission is this:

FPC will not flout the Supreme Court by failing to take the steps directed in the Phillips decision, even though FPC took the side of Phillips in the appeal and even though it may endorse legislation to exempt all producers from its jurisdiction. It will proceed against Phillips, hoping that this test case will point some solutions to the many problems of fixing field prices of gas.

**Problems are recognized . . .** The commission is increasingly aware that it has a responsibility for maintaining a healthy condition in the industry it regulates and that it does not have the sole function of forcing down consumers' rates. It has learned much about the nature of the gas-producing business, the risks of wildcatting, the development of gas reserves, and the need for incentives to maintain a supply of gas. It realizes that interstate lines will have little gas to move in a few years if producers find it too onerous or too profitless to sell gas to them.

The saner heads on the commission are aware that from a practical standpoint it would be virtually impossible to regulate every one of the more than 2,000 independent producers in the same way that FPC regulates the earnings and practices of a relatively few interstate utility pipelines. It would require an annual appropriation of many millions and a whole army of lawyers and accountants to police every gas well, gasoline plant, and sales contract.

So FPC, in its present mood, can be counted on to move as slowly as it can with good grace, feeling its way rather than rushing into this new field of regulation, acting moderately and reasonably though adhering to the law as interpreted by the courts.

**The Panhandle case . . .** What may develop into a broad avenue of escape for gas producers was tentatively surveyed by FPC last April in its decision in the rate case of Panhandle Eastern Pipeline Co. *(The Oil and Gas Journal, April 26, page 120).*

In that case, the FPC flatly stated that the traditional utility-type of rate regulation is not applicable to the production of natural gas. Instead it blazed a trail in the direction of acceptance of the "going field price" of gas as the basis for starting its rate regulation.

The gas involved in that case was produced by Panhandle itself, and FPC allowed it to go into the rate base at a figure equal to the average price of other gas sold from the same fields. This decision still might be upset by the courts, or by Congress, and even as it stands it has no direct bearing on sales by independent producers.

But in reaching this decision, the commission must have had in mind the possibility that the same principle might be applied in case it were faced with the necessity of passing on sales by independent producers.

If it should develop that FPC generally accepts an average or representative field price as a fair figure for the price of gas before it starts an interstate journey, the FPC would not have to determine the investment and earnings of all producers. It might do so in some unusual cases, but the bulk of the producers would escape detailed regulation. However, all producers connected to interstate lines might have to file their sales contracts and other reports with FPC.

**State minimum prices . . .** Another possible way in which some producers may avoid FPC regulation is through minimum field prices fixed by state conservation authorities.

It is conceivable that the commission

## Imperial Refinery at Regina Opened

**Imperial Oil Ltd.'s expanded and modernized refinery at Regina, Sask., shown in the aerial photo above, has been officially opened. The 2-year, $7,000,000 expansion boosted the refinery's daily capacity from 17,000 to 22,500 bbl. Among the new units is a 7,500-bbl. fluid cat cracker—the largest in the province—a vacuum distillation unit, treating plants, a technical building, and mechanical shops. Premier T. C. Douglas, John R. White, Imperial president, and Ward O. Longworthy, refinery superintendent, spoke at the official opening. The original refinery was built in 1916 with a daily capacity of 1,500 bbl.**

may accept such fixed prices without question and would not attempt to exert jurisdiction over contracts not in excess of the minimum field schedule. At present, only Kansas and Oklahoma have set minimum prices, and only for parts of Hugoton field.

In the Northern Natural case, FPC refused to allow the Kansas minimum price as proper for gas produced in Hugoton by Northern Natural itself. However, that was prior to the new policy adopted in the Panhandle case, and it would seem necessary for the commission to reverse itself on this point if the Panhandle case is to govern.

In other cases, FPC has not questioned purchase of gas from independents at state-fixed minimum prices. Now that the Phillips decision gives it the right to regulate producers' sales, FPC might take the position that state laws have no effect where interstate commerce is involved. Or it might consider minimums as "going field prices" under the Panhandle doctrine and decline to question contracts made under protection of state conservation laws.

**Those escape clauses . . .** Many producers have a feeling of security against interference by FPC because their sales contracts to interstate lines contain "escape clauses" under which the entire contract becomes null and void if ever the federal Government attempts to change its terms or prices.

In one form or another, such escape clauses have been common ever since about 1947 when the first threat of federal regulation made its appearance. Some large transmission companies buy virtually all their gas under such contracts, and, theoretically, they would be out of business overnight if the FPC moves in on their suppliers. This prospect is counted on to deter the commission from any action.

But many lawyers say these escape clauses aren't worth the paper they are written on, arguing that once property is dedicated to public use it cannot be withdrawn. Furthermore, even if such clauses are valid and enforceable, many producers would not be in position to apply them because they would have no other outlet for their gas and could not shut in their wells completely because of obligations to royalty owners and creditors.

So the value of these escape clauses is doubtful, and any attempt to apply them is expected to lead to a complicated maze of lawsuits. In any event, it is unlikely that any attempt would be made to test the validity of an escape clause until the FPC makes an overt act toward changing the prices named in a specific contract.

# Senate More Generous

## Conference battle looms as Senate committee restores funds slashed from Interior Department budget by House

WASHINGTON.—A generous Senate Appropriations Committee has not only restored all funds cut by the House from the appropriation bill for the Oil and Gas Division and other agencies of the Interior Department, but has actually given the President more than he asked for on some items.

The bill passed by the House was nearly $63,500,000 less than suggested in the budget. All but $150,104 of the cut was restored by the Senate committee last week. The budget called for a total appropriation of $427,751,110 for the department's operation during the fiscal year which begins July 1.

Here is what the Senate committee did on appropriations of interest to the oil and gas industry:

**. . . The $150,000 requested** for enforcement of the Connally Hot Oil Act, cut to $125,000 by the House, was approved in full.

**. . . The $200,000 cut** by the House from the $300,000 requested for the Oil and Gas Division was restored.

**. . . The $11,483,000 allowed** by the House for the Bureau of Land Management out of $11,625,000 was increased to $12,413,000 — more than sought in the budget.

**. . . An allowance** by the House of $25,362,685 for surveys, investigation and research by the Geological Survey was increased to $25,860,000, against $27,335,000 requested.

The fund for conservation and development of mineral resources by the Bureau of Mines, cut by the House from a requested $13,750,000 to $12,564,000, was increased to $13,650,000. The fund for general administrative expenses, cut from $1,250,000 to $850,000 by the House, was increased to $1,200,000 with a recommendation that the $50,000 cut remaining be applied to the operation of the bureau's regional offices.

The committee took the position that the full fund of $300,000 is necessary to assure continuation of the OGD's work of providing coordination and advice to the federal Government on all phases of petroleum and gas.

But, the committee expressed concern over the number of high-paying positions shown in the agency's personnel schedule. This was a major factor in the House committee's decision to cut the allowance by two-thirds, and its suggestion that Secretary Douglas McKay evaluate the OGD positions with respect to others in the department.

Before it can be sent to the White House the bill will have to go to conference, where the House is expected to put up a strong fight against the increases made by the Senate. The bill finally approved is expected to carry considerably less money than granted by the Senate.

# Import Ceiling Asked

## I.P.A.A. asks legislation providing flexible tariff

WASHINGTON.—A ceiling of 800,000 bbl. daily on imports of foreign oil will be asked of Congress by the Independent Petroleum Association of America.

The decision to ask legislation to deal with the import problem was reached last week at a meeting in Washington of the association's executive and import policy committees.

Recently announced reductions of imports by several companies were said by William M. Vaughey, president of the I.P.A.A., to be a "constructive" recognition of the serious problem confronting the entire oil industry. But those reductions, he said, will fall short of the needed adjustment from more than 1,000,000 bbl. daily at present to approximately 800,000 bbl.

"Unless this is accomplished, domestic production faces possible restrictions," Vaughey declared.

Vaughey disclosed that the association will ask Congress to formulate legislation to reduce imports to the desired level in a manner that will recognize the security of the United States, Western Hemisphere solidarity, and "true reciprocity in international trade." He said methods of achieving this were explored and the group is convinced it can be accomplished through a flexible tariff approach.

Association spokesmen refused to say whether the legislation would be sought as an amendment to the Reciprocal Trade Agreement Act or in a separate measure, but the wording of the announcement indicated the latter as most likely. There is little expectation that Congress will do any more on the trade agreements law than to extend it for another year practically as now written.

The Washington meeting was called

to discuss ways of carrying out a resolution adopted by the I.P.A.A. at its Denver meeting last month, recommending that Congress be urged to enact legislation to correct the import problem.

## New Rate Policy

### FPC to consider field price in setting gas-line rates

WASHINGTON. — Barring a challenge in the courts, the Federal Power Commission's new policy on rate making is now effective.

The policy is to consider field price rather than cost of acquisition of pipeline-owned natural gas for rate-making purposes. It went into effect as a result of FPC's rejection of applications for rehearing of the Panhandle Eastern Pipe Line Co. case.

The commission last week announced it had rejected requests for rehearing filed by the city of Detroit, Michigan Consolidated Gas Co., and Wayne County, Michigan.

There was no indication whether the unsuccessful applicants would carry the matter to the courts, but the city of Detroit and Wayne County have vigorously fought FPC decisions which they felt were adverse to the interests of consumers. Detroit was one of the group which in November 1951 initiated the proceedings that eventually led to last week's Supreme Court decision in the Phillips Petroleum Co. case.

In denying the applications the commission said the substantial contentions raised had already been considered and rejected and its decision on Panhandle's rates "fully accords with all requirements of the Natural Gas Act."

Commissioner Claude L. Draper dissented from the decision of the majority.

### NPC Session Scheduled

WASHINGTON.—The National Petroleum Council will hold a midsummer meeting in Washington July 15.

It will be the first meeting of the NPC since the Petroleum Administration for Defense was liquidated and the Oil and Gas Division revived.

Chairman Walter S. Hallanan said reports from committees on oil and gas emergency defense organization, petroleum storage capacity, and the use of radio and radar in the oil and gas industries may be submitted for consideration. A special committee report on tributes to PAD personnel is definitely scheduled to be made.

## WATCHING WASHINGTON

**Bertram F. Linz**

### Tax Bill Faces Fight

Bitter fights over depletion for the natural resource industries, double taxation of dividends and the personal exemption are expected when the tax-revision bill reaches the Senate floor later this month.

These will be the "Big 3" among the issues. If the Senate finance committee, now putting the finishing touches to the bill, wins on these points it will have little difficulty in having the measure approved without much change.

The action of the committee in rejecting attempts to cut the 27½ per cent oil and gas depletion and its grant of a 23 per cent rate to some 28 minerals has aroused considerable opposition among some senators. The proposal to begin the elimination of the present double taxation of corporate dividends has raised the cry of class legislation. The idea of a $20 flat credit for individuals in addition to the present personal exemption, suggested by Sen. Walter F. George of Georgia but opposed by the committee, is getting support among members who are up for re-election this year.

The fight against the oil industry's depletion allowance is being led by Sen. John J. Williams of Delaware, who is seeking to cut it to 15 per cent. If he should be successful it would mean cutting back also the increased rates granted the 28 other materials. Senators from the mining states are preparing to gang up on the idea.

### Controls Split Indicated

Top administration officials are giving much thought to what will happen to the economy if it becomes necessary for the United States to intervene in Indo-China.

The big question is whether to go back to material, price, wage and other controls, as we did in 1950, or let the country swing into a new boom. All indications point to a sharp split in the administration on that question.

Conservative members of the Cabinet, the Federal Reserve Board and important congressional leaders will oppose controls in another "limited" war. Many of them believe the controls of the Korean period were a mistake and that the economy would have fared better without them.

Meanwhile, price regulations for individual industries are being written in the Office of Defense Mobilization.

The idea in the ODM is to avoid the delay and mistakes of the last big war and the Korean emergency in getting the economy under control. To supplement the price regulations, a bill providing for a 90-day freeze on prices and wages has been written. President Eisenhower is being urged to ask Congress for enactment of the measure. It would give him, rather than Congress, the say on what constitutes an emergency. In some quarters it is predicted the bill will go to Congress within the next few weeks if the current Geneva discussions on peace in Viet Nam break down.

There is no question of the administration's apprehension that another "police action" is a likely development of the near future despite all expressed hopes for a peaceful outcome of the Geneva negotiations.

### One Way to Balance Books

The United States could reduce the national debt substantially, become really solvent with a balanced budget, and reduce taxes by selling off some of its assets.

A little-advertised bill to that end, introduced last year by Rep. Martin Dies of Texas, may get a hearing before a congressional committee before the end of the session.

Dies' bill would have the government put on the auction block public oil lands and other assets estimated to be worth from $150 to $200 billion. The money would be used to reduce the national debt which now is larger than the combined debt of all other countries.

Dies' idea is merely a projection of administration policies to get the federal Government out of business. While administration officials have spoken of returning some of the public lands to the states so that they could be privately developed and placed on the tax rolls, Dies would have the government sell them. That would achieve the same end results and give the government some money to boot.

# New Lubes Here to Stay

## S.A.E. symposium on multigrade lubricating oils points to better mileage, less valve sticking, easier starting

ATLANTIC CITY.—The S.A.E. 10W-30 and other multiple viscosity crankcase oils are here to stay.

This was the consensus of authors participating in a symposium on multigrade lubes at the summer meeting, Society of Automotive Engineers here last week.

There was general agreement that the high viscosity index oils better meet the severe requirements posed by today's high compression ratio, souped-up automobile engines. New reports on research projects pointed to better gasoline mileage, higher oil mileage, lower octane requirement increase, less sticking of hydraulic valve lifters and easier starting.

Customer acceptance, once the early mistakes on oil consumption were corrected, has been generally good. The lower marketing costs involved in handling fewer grades combines with the other benefits to assure the future of the multigrade lube oil.

The newer oils differ from conventional lubricants, in that they are compounded from narrow boiling point distillate fractions, and viscosity improver polymers. This eliminates the low volatility fractions such as bright stocks and heavier neutrals, which increase combustion chamber deposit formation, and the high volatility fractions which contribute to poor oil consumption.

Discussing "The New Look in Lubricating Oils," J. B. Bidwell and R. K. Williams of Research Laboratories Division, General Motors Corp., reported further on the characteristics of these new oils. Their studies of a number of oils showed in general that octane requirement increase and combustion chamber deposit weight were lower than conventional oil containing bright stock.

They found fuel economy using the high V.I. oil to be somewhat better, the advantage decreasing from 6 per cent under engine starting conditions to 2 per cent or less for trips of more than 4 miles.

**New tests needed . . .** New test procedures to measure the properties of oil concerned in sticking of hydraulic valve lifters and wear on cam followers, were reported by F. S. Wood of Standard Oil Co. (Ind.). The varnish test and the rust test determine the valve-sticking characteristics of an oil. To pass these tests, an oil needs no high additive content nor must it pass a test in a diesel engine, said Wood. It takes special additives designed specifically to cure sticking.

In testing the effect of oils on rust and wear, the research team should use the engine in which the problem exists rather than an arbitrary bench test. Additives which will cure the problem in the engine can be overlooked in the laboratory, he concluded.

**Technical problems . . .** Carl W. Georgi, technical director of Quaker State Oil Refining Corp.'s Research Laboratories, outlined some technical problems brought about by the new trend in motor oils. It would be possible, he said, by heavily dosing a low viscosity base oil with V.I. improver, to make a 5W-50 oil. Aside from the very poor consumption characteristics of such an oil, he cautioned that it might fail to fulfill its primary function—lubrication.

He mentioned the doubts that exist, whether a 10W-30 oil will prove suitable for use where an S.A.E. 20 grade is needed, since the multiple grade meets the viscosity ranges for 10W, 20W and 30, but not for S.A.E. 20. Other multigrade oils, such as 20W-30 and 20W-40 also involve skipped grades.

The doubts might be cleared by amending the S.A.E. viscosity classification. But Georgi posed the question: "Are seven viscosity grades per the present S.A.E. classification really necessary, and do present-day engines really need or require these seven grades?" The new trend in motor oils makes one wonder if the present S.A.E. viscosity classification hasn't become obsolete.

Georgi next turned his attention to the standard methods for determining viscosities. The advent of the multi-vis oils containing heavy dosages of V.I. improver have compromised reputation of the A.S.T.M. viscosity-temperature charts, he said. Since these charts cannot be depended upon to extrapolate the viscosity of the new oils at 0° F. there remains the matter of determining their viscosities at that low temperature. Unfortunately, Georgi pointed out, the low temperature-viscosity measurements on motor oils in conventional Saybolt or Kinematic viscosimeters produce fictitiously high results.

He concluded: "It appears motor oils become non-Newtonian fluids at sub-zero temperatures and may have actual viscosities ranging up to 10 times higher than indicated by the customary A.S.T.M. viscosity-temperature extrapolations. Some caution seems necessary in interpreting A.S.T.M. charts in the low temperature region, as well as in formulating motor oils for low temperature service."

# Injunction Sought

## Suit claims Texas Eastern aims at products monopoly

NEW YORK.—A suit to enjoin the Texas Eastern Transmission Corp. and affiliated companies from carrying out a program which allegedly would permit them to monopolize the transportation of petroleum products from the Texas-Louisiana-Arkansas refinery area to points along the Mississippi and Ohio River valleys has been filed in the Federal Court for the Southern District of New York.

The complaint was filed by River Co., Inc., and Chotin Towing Corp., New Orleans, and the Greenville Towing Co., Greenville, Miss., against Texas Eastern Transmission Corp., Texas Eastern Production Corp., Triangle Pipeline Co., and Triangle Refinery, Inc.

The same plaintiffs were in a group which filed a similar suit in December 1952 against a proposal of the United States Pipe Line Co. to build a products line from Texas to New Jersey which would operate under a guaranteed-tender plan.

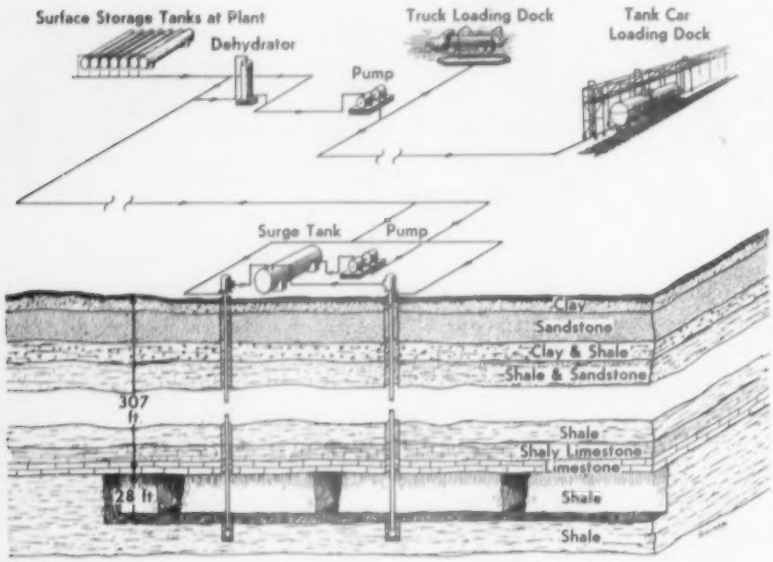
**Charges . . .** Basis of the current complaint is a proposal by Texas Eastern to convert the Little Big Inch pipeline from natural gas to clean petroleum products from its origin near Beaumont, Tex., to a point on the Ohio River near Moundsville, W. Va.

The barge operators allege that the conversion and long-term commitments from shippers of petroleum products which they assert Texas Eastern is soliciting will result in their being denied a competitive opportunity for access to the market for the transportation involved.

The barge operators also allege that Texas Eastern and Triangle Pipeline, which operates a pipeline from Carthage, Tex., to Arkansas City, Ark.,

are combining to monopolize and restrain trade in violation of the anti-trust laws.

The complaint further alleges that Texas Eastern is soliciting the owners of the Project 5 pipeline, operating from El Dorado, Ark., to Helena, Ark., and the Oklahoma Mississippi River Products Line, Inc., to be operated from Duncan, Okla., to West Memphis, Ark., to divert the shipment of products into Little Big Inch line from terminal markets on river ports now served by barges.




## Sinclair Nears Completion on

# 110,000-Bbl. Mine for L.P.G.

SEMINOLE, Okla.—Construction of Sinclair Oil & Gas Co.'s 110,000-bbl. underground storage facility for propane is now being completed and the mined-shale cavern is expected to be placed in operation by mid-July.

Site for the storage was selected near Seminole after detailed geological study of the area revealed the existence of the deep, dry shale formation overlaid with limestone cap rock. Preliminary work included drilling of six test wells with complete drilling logs, coring, and electric logging of all formations, and pressure tests on the sections to be used for the storage.

The mine is located less than 5 miles from Sinclair's Plant 13, its source of propane, and is located near a paved highway, away from population centers and near available electric power.

Started last August by Fenix & Scisson, Inc., Tulsa, the construction has employed conventional mining methods and equipment. A shaft was sunk to a depth of 308 ft. to the floor of the cavern reservoir. The shale formation excavated to form the storage cavity was encountered from 298 to 308 ft. just below the Belle City limestone Drifts or tunnels, each 28 ft. deep and 15 ft. wide, were excavated in two directions from the mine shaft. The first two drifts extend along the strike of the Belle City limestone. Others were excavated down dip and connected at the ends.

After the excavation was completed a 42-in. steel casing was cemented the full length of the mine shaft. A 14-in. well was drilled through the limestone 150 ft. north of the main shaft and 12-in. casing set and cemented to allow installation of a standby pump.

An 8⅝-in. casing string will be run in both the 42-in. and 12-in. casing with a foot valve at the bottom. The foot valve opens when the pump is set in place and closes when it is necessary to pull the pump.

As soon as all equipment is in place, the reservoir will be tested for leakage with air at 150 psi. Pressure on the plant's storage tanks—at 200 psi.—will transfer propane from the tanks into the underground storage and two 4 by 7-in. deep well type centrifugal pumps driven by 30 hp. electric motors will remove it.

# Union Date Uncertain

## Indications point to delay for August merger meeting

WASHINGTON. — Leaders in the move to merge oil and chemical industry labor organizations into one big union were reluctant this week to forecast whether a ratification meeting, originally proposed for August 23, will be held on that date.

O. A. Knight, president of the Oil Workers International Union, in Washington for a big C.I.O.-A.F.L. meeting to discuss a no-raiding agreement, indicated there have been no developments since the O.W.I.U. voted at Cleveland, June 3, to affiliate with the new group.

So far the oil union has not amended its constitution to provide for the merger. The executive committee has been authorized to put the necessary constitutional changes into effect not more than 24 hours before the merger actually is ratified.

Also still in the air is the question whether the new union will affiliate with the C.I.O., of which the O.W.I.U. is a member. The question of affiliation will have to be settled by the new union itself, in which the O.W.I.U. group, by reason of its size, will be a dominant member.

The actual date of the ratification convention will be set by a nine-man committee when a satisfactory number of organizations have voted to participate. It is reported in Washington that one local of the Central States Petroleum Union at Sugar Creek, Mo., already has voted to go into the new organization, but Knight said all the interested unions will be given all the time they want for a thorough study of the proposal.

At its meeting in Cleveland the 27-man O.W.I.U. policy committee decided the union this year will seek a 5 per cent wage increase, but softened the demand by promising it would not call a strike during the wage negotiations.

## Two Refineries Will Close

ASHLAND, Ky.—Two of the seven refineries owned by Ashland Oil & Refining Co. are being closed this month as the company cuts back the production of heavy fuel oil.

The two plants are the 15,000-bbl. per day Findlay, Ohio, refinery and the Louisville, Ky., plant, rated at 9,500 bbl. per day. Neither of these plants is equipped to produce high yields of gasoline. Their closing was brought about by the present fuel oil market.

## Atlantic Cuts Imports

### Sun, however, reveals it will begin importing crude

AUSTIN.—Atlantic Refining Co. last week became the fourth importing company to announce a cutback in imports.

Atlantic notified the Texas Railroad Commission it will cut its crude-oil shipments from Venezuela and Kuwait by 6,500 bbl. daily, or about 10 per cent, for the rest of this year.

This decision was offset by a Sun Oil Co. announcement that has discontinued its policy of depending almost entirely on domestic crude and will import about 7,500 daily for its Marcus Hook, Pa., refinery.

Robert G. Dunlop, Sun president, said Sun's earnings recently have been reduced by the curtailment of its production, particularly in Texas.

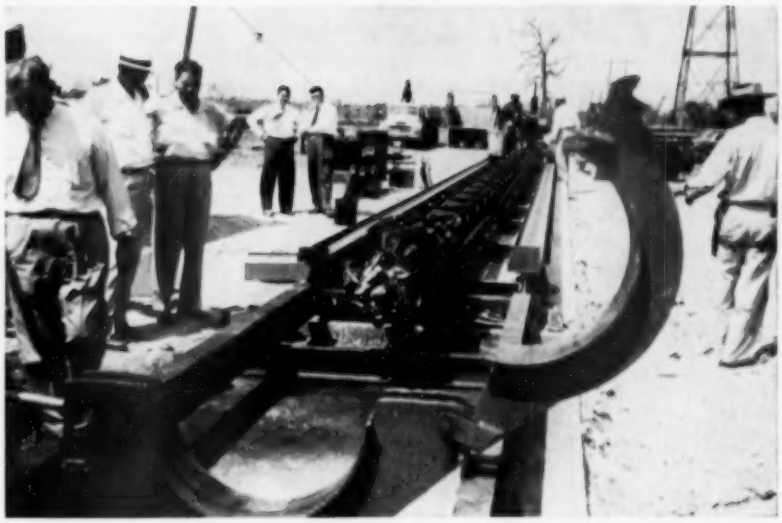
Sun, he said, has been forced to buy crude at market prices to meet product demand, when the oil could have been produced from its own wells. This condition, he added, "is particularly aggravating in connection with East Coast refinery operations where a majority of refineries are operating to a very material degree on low-cost foreign crude."

Companies which earlier had announced plans to reduce imports are Esso Standard Oil Co., The Texas Co., and Pan-Am Southern Corp., a subsidiary of Standard Oil Co. (Ind.) *(The Oil and Gas Journal, June 7, page 75).*

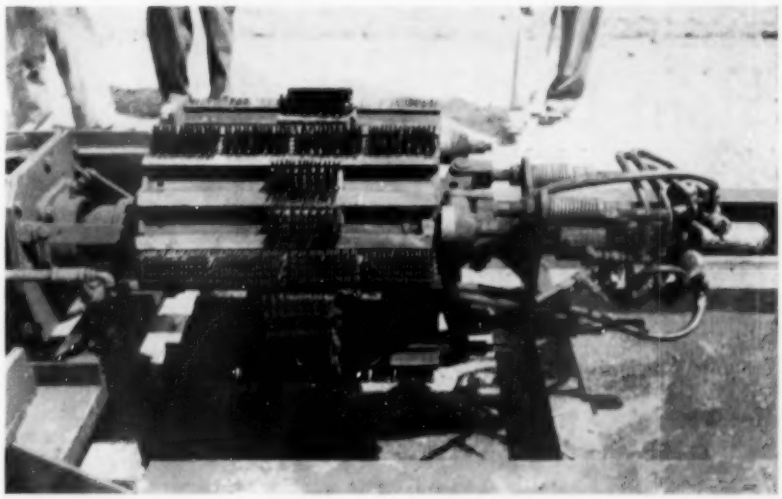
## Industry Briefs

**COLORADO CITY, Tex.—Shell** Pipe Line Corp.'s West Texas area offices will be moved from here to Midland. D. E. Sears, Shell Pipe Line vice president, said the move is necessary because of the growth of the Permian basin and the extension of production throughout West Texas and eastern New Mexico. The move will be made over an 18-month period beginning in August. New offices will be in Midland's Petroleum Building.

**MOUNT PLEASANT, Mich.—** Three more purchasers of Michigan crude have followed the lead of Roosevelt Oil & Refining Co. and Leonard Pipeline Co. in reducing postings 12 cents. The three, all of whom delayed posting reduced prices until June 1 for bookkeeping purposes, were Ray Refining Co., Commonwealth Pipe Line Co., and Naph-Sol Refining Co.



## Big Cradle Holds Pipe Joint . . .



## . . . For Rotary Brush and Coater

HOUSTON.—New equipment which cleans the internal surface of pipe joints on one pass and then sprays the surface with a corrosion-resistant protective coating on the reverse trip was demonstrated here last week by Crutcher-Rolfs-Cummings, Inc.

The new unit consists of a rotating head driven by a hollow shaft 50 ft. long. The assembly, powered by a 40-hp. diesel engine, travels along angle iron rails on disk rollers moving the rotating head and its wire brushes through the pipe joint. A 100-hp. air compressor moves with the assembly and the air blows rust particles out of the pipe as it is cleaned.

On the reverse pass, three spray guns spaced on the front of the rotating head coat the newly cleaned internal surface of the pipe with an Epon resin base coating. The new unit was developed by C-R-C to meet a long standing demand for a low cost method to mitigate internal corrosion and produce a smooth surface to increase throughput. Costs for 30-in. pipe are estimated at 30 to 40 cents per ft. Possible increases of gas throughput as a result have been estimated at 3 to 5 per cent.

Details of the operation will be presented in an article by F. Lawrence Resen in a forthcoming issue of the Journal.

**TYPICAL TERRAIN** in the Hofflund-Charlson field area is pictured here. Existing wells are on the craggy bluffs on both sides of the Missouri River basin. The Garrison Reservoir will eventually flood the river lowlands and cover potentially productive oil lands.

# Slant Drilling Planned

## Rising waters in Garrison reservoir cause Amerada to seek permit for North Dakota's first directionally drilled hole

WILLISTON, N. D.—Amerada Petroleum Corp. has applied for permission to drill North Dakota's first slant-hole well from a Hofflund field location. The hole would be bottomed in an area which will eventually be flooded by the Garrison reservoir.

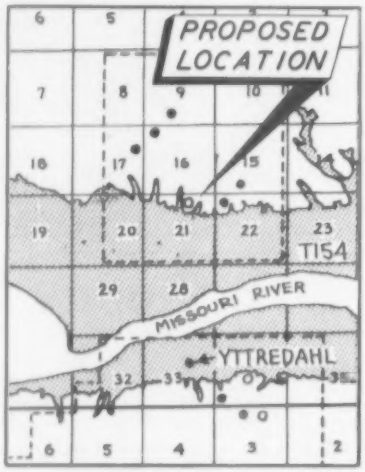
A hearing on the application has been scheduled for June 16 before the Industrial Commission at Bismarck.

This would indicate that Amerada has decided to use directional drilling rather than barges, platforms, or earthen mounds built in the lake to produce the reservoir.

If approved, the well will be North Dakota's first directionally-drilled well. So far whipstocking has been used chiefly in North Dakota to bypass junk in a hole after fishing failed.

**Location . . .** Amerada is seeking permission to drill its 2 Joseph Viall, Tract 1, with the rig in the NW NE 21-154n-95w, Williams County, and the well bore deviated to the southeast to bottom the well in SE NE 21-154n-95w.

The company is now drilling the 1 Viall in the NW NE of Section 21. If it is completed successfully, the rig would be skidded a short distance to start the directional well.




The 2 Viall would be an 80-acre southeast offset to the 1 Viall and an 80-acre southwest offset to the 1 Zok unit, which has been in production several months.

The ground elevation of 1 Viall is 1,891 ft. above sea level, well above the maximum 1,850-ft. level contemplated for the Garrison Reservoir. A series of terraces slope downward to the river valley where the 2 Viall would normally be located.

**Amerada's problem . . .** Amerada already has one well, the 1 Yttredahl, in an area that will be inundated by the reservoir. Its tanks and production equipment are on higher ground, but if the reservoir level reaches 1,850 ft., water may reach the site of the tanks.

The 1 Yttredahl is in the northern limit of the Charlson pool and is south of the Missouri River from the location for the proposed new well. Geologists believe the Hofflund and Charlson may be one field, but until wells probe the river this will remain speculation. Both produce from the Madison.

Amerada, at any rate, controls the major portions of both Hofflund and Charlson, which lie in the path of the Missouri's rising waters. Not even the U. S. Engineers have been able to set up a timetable on the rise of the water level. There is also a question about the ultimate water depth, with both 1,830-ft. and 1,850-ft. depths talked.

As the principal operator in the area of both fields to be flooded, Amerada has studied the problem for some time. The company was disappointed in the production from its five wells to date in the Hofflund and the same is true to a large extent of its Charlson wells. Because of this, Amerada has watched the economics involved even more closely than it might have otherwise.

The company faces the possibility that it might drill marginal wells on the edges of the fields, spending more money to probe the flood area and get less production than it has in those on high and dry land.

## New System Planned

### Sinclair-Pure crude line to serve Colorado, Kansas

INDEPENDENCE, Kans. — A $25 million construction program to modernize existing crude pipeline facilities in central Kansas and extend the system through western Kansas to the Denver-Julesburg basin of Colorado will be undertaken jointly by Sinclair Pipe Line Co. and Pure Oil Co.

The enlarged system will extend 494 miles from Merino, Colo., southeast through Colorado and Kansas to Humboldt, Kans., where it will connect with Sinclair's "Big Inch" system now carrying crude to Chicago and St. Louis refineries.

The system will have an initial capacity of 80,000 bbl. daily and will be jointly owned by the two companies. The 319-mile section from Merino to Great Bend, Kans., will be of 18-in. pipe. The 175-mile stretch to modernize Sinclair's system from Great Bend to Humboldt will be of 20 in.

In addition to a Rocky Mountain region which produced 144,000,000 bbl. last year, the improved system will serve the rapidly expanding central Kansas uplift, which will add another 30,000 bbl. daily of Kansas production to the line.

Since the system will have a gravity fall of some 3,500 ft. over its length it will begin operations with only one pump station at Merino. Construction is slated for completion by early 1955.

### Products Line Started

DENVER. — Construction of Wyoming-Nebraska Pipeline Co.'s 220-mile, 6-in. products line from Cheyenne to North Platte is now under way.

The line is being built by a joint venture formed by Gulf Interstate Engineering Co., Houston; H. C. Price Co., Bartlesville, Okla.; and Houston Contracting Co., Houston.

Gulf Interstate Engineering Co., a subsidiary of Gulf Interstate Gas Co., is a new concern organized to undertake engineering and construction management of petroleum and natural-gas pipelines. The Wyoming-Nebraska line is its first important project. Officers of the engineering company are Hy Byrd, president; Farrile M. Young, vice president; Gene Woodfin, vice president and secretary; and J. A. Staples, treasurer.

Field operations for construction of line and stations for the Wyoming-Nebraska project are being handled by Houston Contracting Co.

Wyoming-Nebraska Pipeline Co. is an affiliate of Frontier Refining Co., Denver. M. H. Robineau is president of the pipeline company, J. Howard Marshall of Signal Oil & Gas Co., Los Angeles, is vice president, and Harry A. Brown, operating vice president.

## Proration Urged

### Laws for three states endorsed by R.M.O.G.A.

BILLINGS.—Early enactment of proration laws in Colorado, Wyoming, and Nebraska was endorsed by an overwhelming vote of the directors of the Rocky Mountain Oil and Gas Association at the midyear meeting here June 5.

The legislative committee was instructed to press for enactment of the so-called model statute of the Interstate Oil Compact Commission with exception of the clause on field-wide compulsory unitization. The legislatures of all three states will meet in January, and many observers believe that all of them will enact the new laws early in the year.

This action is a reversal of the association's previous position in opposition to market-demand proration. It came after the group was addressed by William J. Murray, Jr., member of the Texas Railroad Commission, who spoke on the need for effective conservation regulations to protect reserves and maintain orderly development of producing facilities.

Identical laws in all three states was felt to be desirable because all of them market through the same pipeline outlets. Montana, which has no pipeline outlet for its crude, was omitted from consideration at this meeting because that state's oil and gas conservation board is currently engaged in writing new regulations.

It is understood that the Nebraska Legislature may favor adoption of the entire I.O.C.C. draft, including field-wide unitization, but the association did not want to complicate consideration of proration laws in Colorado and Wyoming by the possibility of a conflict over unitization at this time.

# SOUTHWEST

## Transfer Approved

### Railroad trust wins first round in forming oil firm

DALLAS.—Judge Dallas A. Blankenship, Dallas District Court, ruled here last week that Texas Pacific Land Trust has the legal right to transfer its oil and gas rights to a proposed $150,000,000 operating oil company.

The trust was set up in 1888 by Texas & Pacific Railway to administer lands granted it by the state not actually used in building the railroad. It now owns 1,797,156 acres in 29 Texas counties and holds mineral leases on 181,327 acres in 19 other counties. Income at present is derived mostly from leases to companies operating on its properties.

The court's ruling, made in the form of a declaratory judgment, that the trust could set itself up in business as an operating company cleared away one of three big hurdles *(The Oil and Gas Journal, March 22, page 117)*. The trust still must obtain approval of the move by holders of three-fourths of its certificates and subshare certificates. Certificate holders include: Lehman Corp.; U. S. Smelting, Refining & Mining Co.; Bear, Stearn & Co., and others.

Also, before any action is taken to set up the company, the trust is seeking a tax ruling which would permit the transaction without gain or loss for federal income tax purposes.

The suit for declaratory judgment was filed by Bankers Trust Co. and Louis D. Speir, trustees under the will of Ephraim L. Corning, and the certificate holders mentioned above.

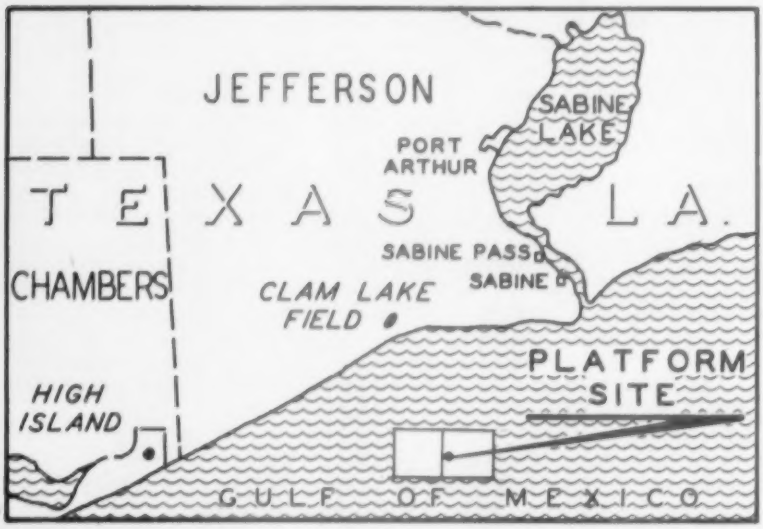
Stock in the new firm would be distributed proportionately to present holders of certificates and subshare certificates in the trust.

### Imports Action Planned

AUSTIN.—The Texas Independent Producers and Royalty Owners Association will be asked this week to call on the Tariff Commission for an investigation of oil imports.

Jack Woodward, Dallas, TIPRO president, said he will ask the association's executive committee at its June 17 meeting in San Angelo to ask the Tariff Commission to determine the effect of present "excessive oil imports" on the domestic industry.

TIPRO's present import policy, Woodward said, calls for a tax or tariff to "remove the price advantage foreign oil enjoys over domestic production."




**MAGNOLIA PETROLEUM CO. soon will test a multimillion dollar acreage located 8 miles offshore from Jefferson County, Texas. The platform will be anchored in the western part of high-priced Tract 10.**

# Offshore Test Nearing

## Magnolia to test high-priced offshore Texas lease block by late July or early August; site is 8 miles off coast

DALLAS.—Magnolia Petroleum Co. will begin drilling probably in late July or early August on an 11,520-acre offshore lease block for which the company paid more than $4,500,000 to the State of Texas at the big lease sale last December.

The lease block comprising Tracts 9 and 10, each 3 miles square and taking in 5,760 acres, lies about 8 miles offshore in Jefferson County and about 14 miles southwest of Sabine Pass, Tex.

Fabrication of a huge five-well platform at Sabine, Tex., is nearing completion. The platform is scheduled to be towed out to location about July 1. The template-type platform will be anchored in the far-western portion of Block 10. Exact location is 5,940 ft. from the south line and 660 ft. from the west line of Tract 10.

**Five wells possible . . .** Magnolia estimates that it will take about 30 days to install the platform and begin drilling. Water at the location is about 35 ft. deep, and the deck of the platform will be 35 ft. above the water level. Drilling will be carried to 13,000 ft. If the wildcat proves successful, the rig will be skidded to each of the four remaining locations, which are about 7 ft. apart on a line. Skidding can be handled as a one-shot operation since rig, engines, draw works, etc., are on a unitized substructure.

The entire platform structure, supported by ninety-four 22-in. pilings, will stretch almost 400 ft. from end to end. The main platform, designed to accommodate drill pipe, casing, and all other auxiliaries, is 256 ft. by 52 ft. Living quarters for the crews will be on a separate platform measuring 55 by 46 ft. The living quarters structure will be located 88 ft. from the main platform for safety reasons and connected by a causeway or bridge. Du Pont Welding Co. is handling fabrication work.

Nearest production to the drill site is Clam Lake field to the northwest and about 2 miles inland in Jefferson County.

**Optimistic of strike . . .** Magnolia, as is obvious from the whopping bonus paid the state, is optimistic over its chances of opening a sizable new field. In the December bidding for the leases, the company offered the high bid of $2,609,180 for Tract 10 (about $456 per acre), topping Pure Oil Co.'s second-high bid of $1,029,565 *(The Oil and Gas Journal, December 7, 1953, page 76)*. It paid $1,923,840 for adjoining Tract 9—again beating Pure which offered $1,544,555. Magnolia also paid more than a million dollars for a lease on 5,720-acre Tract 24 to the south and west of 9 and 10.

# Fields Confirmed

## New major producing area of South Louisiana seen

MORGAN CITY, La. — Confirming and extension wells completed last week in two deep fields, less than 3 miles apart, in southern Assumption Parish, lend support to belief that another major producing area has been uncovered in southern Louisiana.

At Amelia, 14 miles east of here, M. L. Mayfield Co., operating for Herbert Herff, of Memphis, Tenn., and associates, completed its second gas-condensate producer, 1 J. L. Landry et al Unit, located a mile west of its discovery well, 1 Lutcher-Moore.

Comparable in size and depth to the discovery well completed late last December in sand at 14,224-30 ft., the new producer is rated good for 100,000,000 cu. ft. of gas daily on open-flow, based on pre-potential tests, in which it flowed 1,500,000 cu. ft. of gas daily through a 10/64-in. choke with 5,000-psi. pressure.

As in the case of the discovery well, the gas has an exceptionally high liquid content, measured about 60 bbl. of 59°-gravity condensate per 1,000,000 cu. ft. of gas.

**Union completes one . . .** Three miles to the northwest, Union Oil Co. of California has completed its second well in East Lake Palourde field, discovered in April. The new well, 2 Williams, northeast of the discovery well, a prolific oil producer from sand at 13,385-97 ft., opens another sand, slightly shallower (13,150-80 ft.), productive of gas. On a pre-potential gage, it flowed at the rate of 5,000,000 cu. ft. daily through ¼-in. choke with 4,200-psi. pressure.

Active development is in sight for both fields, which eventually may prove a single large area. At Amelia, the Mayfield group, which has a controlled block of approximately 6,000 acres, has plans for four to six additional wells. A location a mile east of the discovery producer, already is being prepared for the third well.

Locations also have been made for two additional wells at East Lake Pa-

lourde. One is to be drilled by Union Oil Co. at 1 Jeanerette, about 3,300 ft. northeast of the discovery well, and the other by California Co. at 1 Lutcher-Moore, about 2,050 ft. north of the latter.

## Sinclair Well Contracted

NEW ORLEANS. — Preparations were under way last week by Sinclair Oil & Gas Co. to spud the first well on a 2,018-acre lease in the South Timbalier Bay area off Louisiana.

The lease was acquired in April for a record $3,127,668 in Louisiana's first offshore lease sale in 6 years. It was bid by a joint venture formed by Sinclair, Sohio Petroleum Co., El Paso Natural Gas Co., and Peoples Production Co. Sinclair is the operator.

Contract for the first well was let to Salt Dome Production Co., Houston, and the contractor last week was moving barges and other equipment into the site. The contract calls for drilling to 12,500 ft. "or salt."

The location is 660 ft. south of the north boundary line of Louisiana State Lease 2490 and 1,980 ft. west of the east boundary. Drilling will be carried on from a shallow water barge in only 7 ft. of water. The lease is located on the southwest flank of the Timbalier Bay field off Terrebonne and Lafourche parishes.

Operations on the newly acquired lease will be directed from a New Orleans office recently opened by Sinclair with George D. Almen, Jr., assistant to the president, in charge.

## Crude Line Half Finished

HOUSTON.—Construction is about 50 per cent completed on a 59-mile extension from here to Sourlake, Tex., of Cities Service Pipe Line Co.'s crude system from Sourlake to Lake Charles, La.

The 16-in. extension, which will have an initial daily capacity of 48,000 bbl., is scheduled to be completed and in operation by July 15. Thirty-three miles of pipe have been laid. O. R. Burden Construction Corp. of Tulsa is contractor. Work began in late April.

Station Construction Co., Houston, has been awarded the contract to build a pumping station on the extension. One of six 120,000-bbl. floating-roof tanks under construction at Fauna, Tex., near here has been completed. The remainder are scheduled for completion by August 1.

The Houston-Sourlake extension will expedite moving crude to Sourlake for transportation to Cities Service Refining Corp's. refinery at Lake Charles.

# Contractor Optimistic

### Not enough equipment, Kerr-McGee says as it prepares to launch another big barge for contract drilling in the Gulf

**Paul Swain**

OKLAHOMA CITY.—If anyone in the oil industry is skeptical about the future of offshore drilling, it isn't Kerr-McGee Oil Industries, Inc.

Already considered a pioneer in contract marine operations in the Gulf of Mexico, Kerr-McGee is convinced there will be more drilling in the Gulf than there is equipment available to punch the holes.

The company regards the tidelands area as still in the wildcatting stage and points out that the Continental Shelf areas, farther at sea, haven't yet been scratched. Kerr-McGee doesn't believe there will be enough equipment to continue the wildcatting and do development drilling, too.

As a partial answer to this problem, Kerr-McGee is building a new and bigger drilling barge. Now under construction at the Pascagoula, Miss., yards of Ingalls Shipbuilding Corp., the barge is slated for delivery in August.

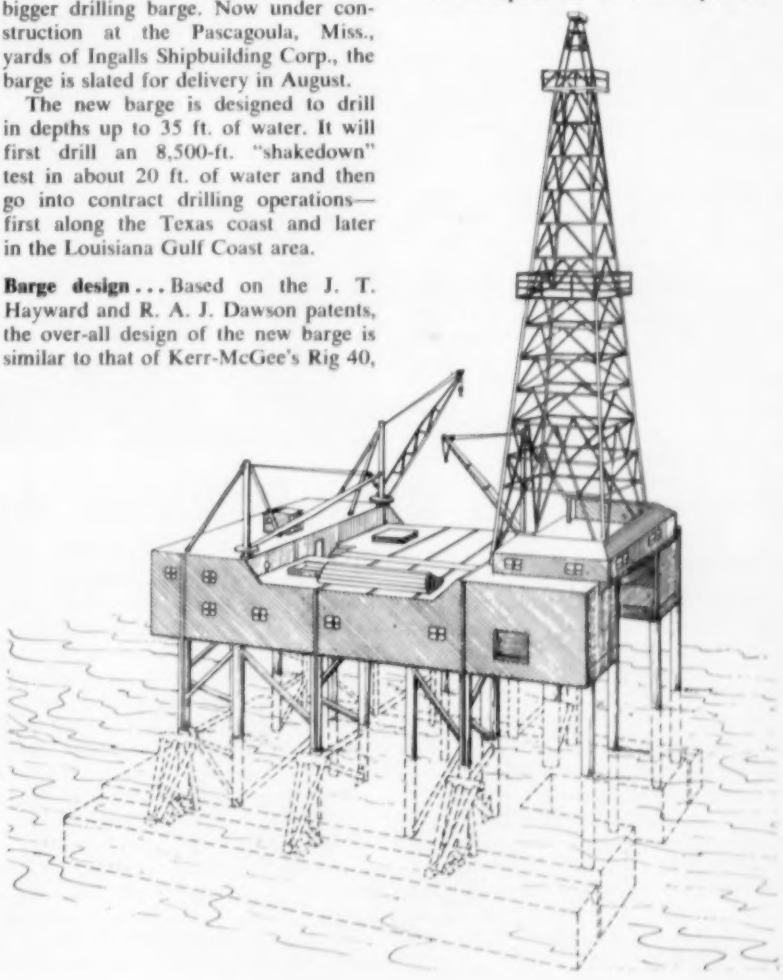
The new barge is designed to drill in depths up to 35 ft. of water. It will first drill an 8,500-ft. "shakedown" test in about 20 ft. of water and then go into contract drilling operations—first along the Texas coast and later in the Louisiana Gulf Coast area.

**Barge design . . .** Based on the J. T. Hayward and R. A. J. Dawson patents, the over-all design of the new barge is similar to that of Kerr-McGee's Rig 40, long active on the Gulf Coast. The new barge, however, is meant for greater water depths and deeper drilling.

The submersible hull of the barge is 140 by 72 by 13 ft. 6 in., with the machinery deck level designed for a height of 60 ft. above the ocean floor. The hull is stabilized during submerging and rising by two hydraulically controlled pontoons 14 ft. wide and 12 ft. deep, extending the entire length of the hull.

**Drilling equipment . . .** To give the barge a short, wide slot to meet all deep-water drilling needs, an unusual layout of drilling machinery is employed. A high-wind capacity 147-ft. derrick is mounted on the forward end of the superstructure with the "V" door facing aft.

The compound of four 450-hp. diesel



engines, equipped with torque converters, is located on the machinery deck below the pipe racks on the "V" door side of the derrick. The draw works is on the same level spotted adjacent to the "V" door instead of opposite it. The four-engine chain compound powers both the pumps and the draw works.

An independent catworks, coring reel and rotary drive is on the upper level derrick floor opposite the "V" door.

Mud pumps, cementing unit, control room, and electrical generators take the remainder of the machinery level space beneath the pipe racks and the mud pits are located aft of the engine room.

**Auxiliary equipment . . .** The barge will be equipped with a new dual T-10 Halliburton cementing unit, a builtin Schlumberger unit, and arrangements for self-contained drilling-mud services. Expendables such as mud materials, cement, casing, fuel, water, and other operating supplies will be stored aboard the barge in quantities to provide for continuous operation.

The pipe-rack deck will be equipped with two 5-ton and one 10-ton electrically driven cranes for hoisting light loads. Air-conditioned quarters to accommodate a crew of 42 will occupy two levels at the end opposite the derrick.

**Expansion plans . . .** Completion of the new barge is Kerr-McGee's first step toward expanded offshore operations. The company anticipates future construction of more and improved drilling equipment for deep-water operations, but nothing concrete is now in the mill.

"Right now we'd like to welcome the man who will tell us how we can best drill in depths of 75 ft. of water or more," a Kerr-McGee official says. "That's the biggest problem facing Gulf operators, and we'd like to know the best answer."

## Gas-Line Contracts Let

HOUSTON.—Construction contracts were let last week by Tennessee Gas Transmission Co., for its new 30-in. line from Kinder, La., to Portland, Tenn.

The new line will increase transmission capacity from the Gulf Coast producing areas to the northeast. The line will begin at the company's compressor station in southwestern Louisiana and will roughly parallel the company's existing 24, 26, and 30-in. system through Louisiana, Mississippi, and Tennessee, joining the existing system at the Tennessee-Kentucky state line near Portland, Tenn.

Contracts announced by T.G.T. total 566.8 miles. Contracting companies and the segments awarded each are:

Morrison Constructors, Inc., 98.7 miles, Kinder, La., to U. S. Highway 84 near Jena, La.; Anderson Brothers Corp., 90.2 miles, Highway 84 to Louisiana side of Mississippi River; Houston Contracting Co., 105.8 miles, Mississippi River to U. S. Highway 51 near Grenada, Miss.; Oklahoma Pipe Line Constructors, 101.6 miles, Grenada to U. S. 45 near Corinth, Miss.; Western Pipe Line Constructors, Inc., 94.9 miles, U. S. 45 to near Centerville, Tenn.; Panama-Williams Co., 75.6 miles, Centerville to Compressor station No. 84 near Portland, Tenn.

# Air-Pollution 'Artillery'

HOUSTON.—Consolidated Chemical Industries, Inc., has enlisted a double-barreled steel weapon in its attack on air pollution at its sulfuric acid regeneration plant here.

The weapon is in the form of two 300-ft. high steel stacks—one to go into operation about July 1 and another later. They will disperse residual gases at an altitude sufficient to allow them to diffuse into the atmosphere.

According to H. C. Snowden, plant manager, the prime components of the off gases are regenerated nitrogen, oxygen, and a small amount of sulfur dioxide. With the first two elements being natural components of the atmosphere, it is the sulfur dioxide which requires the attention. It is the purpose of the tall stacks to discharge the gases at such a height that the sulfur dioxide is diffused to an inconsequential amount, Snowden said. Gases are produced in regenerating acid sludges.

The 300-ft. stack scheduled to be completed by July is 6 ft. in diameter. The stack weighs about 130,000 lb. and will have an additional 24,000 lb. of platforms and ladders. The stack was fabricated at U. S. Steel's Consolidated Western Steel Division's Orange, Tex., plant and shipped to Houston in 15 sections. Consolidated Western's erection crews assembled the structure at Consolidated's plant located near the Houston Ship Channel.

CONSTRUCTION SCENE on the Oklahoma Mississippi River line. This shot was taken in eastern Arkansas, about 30 miles west of the West Memphis terminal.

ARKANSAS RIVER CROSSING near Russellville required 2,000 ft. of deep ditching. Ditch was dug to 8 ft. below deepest part of channel. This approach to the crossing required a ditch as deep as 30 ft. Sand points at right and being driven at left required to pump out water as it seeped into the ditch.

# Products Line Finished

## Last joint welded in 462-mile line; Oklahoma products to begin moving to Mississippi River terminal in August

McALESTER, Okla.—The last joint of pipe was welded near here last week to complete the 462-mile products line of Oklahoma Mississippi River Products Line, Inc.

Pump stations have not yet been completed. It is expected that the first product deliveries will be made at the West Memphis, Ark., terminal in mid-August.

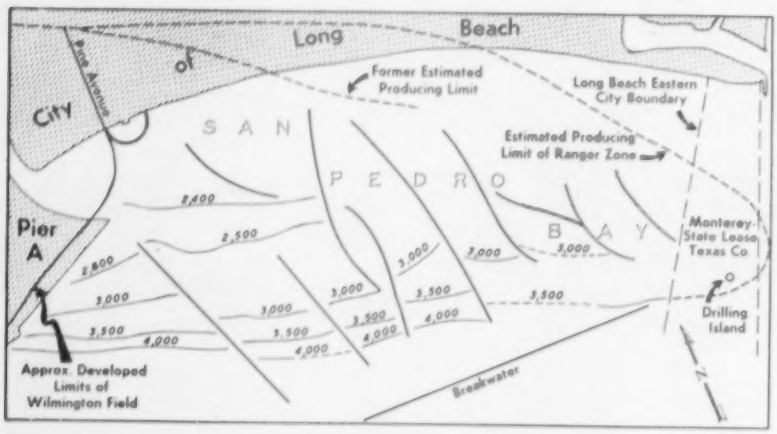
The final tiein on the line was made by River Construction Corp., one of the two contractors which laid the line, at a crossing of Highway 2 east of here.

Completion of the common-carrier system will open a large, new market area to the eastward for Oklahoma refineries. The line terminates on the west bank of the Mississippi River, permitting low-cost water movement to points up the Mississippi and Ohio rivers.

The line originates at the Duncan refinery of Sunray Oil Corp., which holds a 50 per cent interest in the Oklahoma Mississippi River company. The line is 10 in. in diameter from Duncan to Allen, Okla., and 12 in. from Allen to the West Memphis terminal. It will have a capacity of about 35,000 bbl. per day, operating with pump stations at Duncan, Wynnewood, ahd Allen, Okla., and Conway, Ark.

The line will be available to refineries in central and southern Oklahoma (see map). In addition to direct connections with Sunray's refineries at Duncan and Allen and the Wynnewood refinery of Kerr-McGee Oil Industries, Inc., deliveries into the line can be made through the 85-mile, 8-in. Drumright-Allen products line.

Construction of the Oklahoma Mississippi River line was begun early last November. River Construction was the principal contractor, laying the 390-mile section from Duncan to the White River, between Conway and West Memphis. The eastern section was laid by Williams Brothers Co.




# Seismic Picture Good

## Long Beach oil prospects look better, but municipality faces subsidence risk if sub-city reservoirs are drained

**D. H. Stormont**

LONG BEACH.—The seimic survey of this city's offshore oil prospects showed them to be highly favorable, but development—carried out on a unitized basis with portions underlying Long Beach—may involve serious subsidence risks.

Because subsidence may be augmented by withdrawal of fluids and gas from reservoirs under the central business district and residential areas of the city immediately eastward, plans for rapid development are being shelved in favor of comprehensive studies.

The studies will consist mainly in estimating ultimate subsidence, and to what extent it can be minimized by pressure maintenance with water and gas. Another phase will be the legal aspects of unitizing city and private properties.

Development of submerged lands on the city's eastern limit probably would be undertaken if Monterey Oil Co. adopts a rapid development program for its offsetting lease (see page 109). For upland portions, however, any drilling probably will not occur inside the next year.

**Seismic picture . . .** The survey recently performed by Western Geophysical Co. indicates the Torrance - Wilmington anticline continues eastward through the city's submerged lands. The report, filed with the City Council late in May, presented the structural picture somewhat as shown on the accompanying map.

While tending to confirm what many geologists had surmised—that the eastward plunging anticline continued far beyond developed portions—the survey threw considerable more light on oil prospects. One important finding was that more of the structure probably underlies Long Beach than had been suspected previously. Some 600 acres of productive Ranger zone originally were estimated to be present eastward of Pine Avenue, with Temple Avenue forming the approximate eastern onshore limit. Data gained from the survey indicates the onshore productive area may be double this figure. Production may reach as far eastward as Forty-eighth Place.

Because of the bow-in, it may be necessary to drill this triangular area from an upland site rather than from a near - shore island, as had been thought would be feasible. Only the Ranger zone is believed to underlie the city. While this may help the subsidence problem, the zone's shallow depth will require some extremely high - angle holes if drilling is performed from an earth-filled island.

The bow-in, plus an indicated steep dip of the southern flank, also places productive limits further landward of the breakwater than had been projected. If the oil-water contact in the Ranger zone is at a depth of approximately 3,400 ft. subsea, as is the case in the developed harbor area, wells drilled from an enlarged breakwater also would have higher angles than are deemed desirable.

The survey, which involved about 700 shots to gain data for cross-sections, also revealed the structure is divided into a number of fault blocks. Their magnitude varies but the general pattern revealed a decrease in apparent vertical displacement to the southeast. The two phantom horizons mapped, the lower of which is sketched here, are believed to be the Tar and Ranger zones. These are the shallower pays of the seven productive in the Wilmington field. No shooting was carried out within 1,500 ft. of land or the breakwater.

**Time for study . . .** The Los Angeles consulting firm of Stanley & Stolz engaged by the city of Long Beach to guide its oil development, emphasized the risk of subsidence in its covering report. In addition to recommending that an authority on the subject be consulted the report stated:

"We suggest that some of the items to be taken into consideration are the subsidence surveys in the harbor area and a projection of the data disclosed therein to be based on (a) depletion of the presently developed area, (b) the contemplated effect of producing the developed and undeveloped areas to final depletion, and (c) the expected ultimate subsidence in the Long Beach central district.

"Since this investigation needs to be extremely broad, it should not be limited to the above items but should be coupled with a reservoir study to forecast the probable value of a pressure maintenance project in the new area insofar as it would alleviate subsidence."

The city has employed Dr. G. D. McCann of California Institute of Technology to make this study. It is expected to require about 2 months for completion.

Subsidence will not be a problem insofar as development of the structure in submerged areas. As private property owners would object to development to such an extent that their lands were being drained, it is expected that a unitized operation will be undertaken.

## Nevada Test to Get Pump

ELY, Nev.—Shell Oil Co. last week was installing pumping equipment at the Nevada wildcat which will probably become the state's first oil producer.

The Nye County test, 1 Eagle Spring Unit, yielded about 150 bbl. of 19°-gravity oil from 6,450-6,730 ft. on

earlier swabbing tests. The crude's high viscosity requires the well be pumped even though at times it flowed a pencil-sized stream of oil.

General Production Service, Inc., Bakersfield, Calif., will complete the well for Shell. Two crews and a Hopper self-propelled servicing unit started the 550-mile jaunt from Bakersfield last week. Because of the well's remote location, an exceptionally large number of spare parts and supplies were taken.

## Test Drilling Ahead

### Monterey's island venture already is below 4,000 ft.

LONG BEACH.—The long-awaited test which is expected to shed considerable light on the size of the oil reserves lying off Long Beach and neighboring Seal Beach last week was drilling below 4,000 ft.

The island-based test, being drilled by Monterey Oil Co., is scheduled to go to basement at 7,000 to 9,000 ft. As approximately 90 days are to be required for its completion, extensive coring and testing undoubtedly is to be carried out.

The 75-ft. diameter earth-filled structure is about 1½ miles off Seal Beach (See map on page 108). While classed as an exploratory well—and a "no dope" hole—it is only some 600 ft. seaward of a 12,500-ft. well completed in 1947 from an upland drill site.

The hole being drilled is a vertical test, to evaluate shallow formations which could not be penetrated on structure by the completed well because of its high drift angle. Monterey, as operator of the 1,200-acre state-granted lease jointly held by The Texas Co., then will drill two slant exploratory wells to gain an idea of productive limits.

The completed well, which was displaced horizontally some 9,600 ft. in drilling to a vertical depth of 5,400 ft., is believed to be producing from an oil sand correlative with the Ford zone in Wilmington field. How many of the field's six other oil zones will prove productive at this southern end of the structure is yet to be proven. The recently completed seismic survey made for the city of Long Beach indicates the island is near the edge of Ranger zone production.

Completion of the three, and possibly other, wells will give Monterey a good idea of how many wells will be required to develop all zones throughout the lease. Knowing this, the company then can expand the island to one of sufficient size to hold several hundred wells.

## CANADA

**IT'S THE CUSTOM in the "Stampede City" of Calgary, Alta., to present white cowboy hats to its visitors. Here Trans-Canada Air Lines Hostess Evelyn Johnston presents the traditional symbol of welcome to Frank J. Gardner, exploration editor of The Oil and Gas Journal, upon his arrival in Calgary to begin an on-the-spot study of western Canada's new oil developments.**

# Mud Slows Pembina

### Rains cut activity all over western Canada; Imperial's critical tests pass pay zone, but findings are secret

**Frank J. Gardner**

CALGARY.—Drilling operations throughout western Canada have been slowed down considerably by rain, road bans, and field inaccessibility for the past 6 weeks.

Recent heavy rains and snow have only added to the operational difficulties, and until favorable weather conditions permit roads and leases to dry, the movement of drilling equipment and supply transport will be seriously impaired.

The late spring in this active oil region has caused the postponement of numerous wildcat operations and has brought field development, especially in the Pembina area, to a virtual standstill. Some operating companies are reported to be seeking extensions of their commitments, an action that causes many observers to believe that westerly operations, especially in Alberta, may be confined largely to winter campaigns.

During the last half of May completions showed a decided drop, averaging nearly a well per day less than the average for the first 4 months of 1954.

**Activity summary** . . . The activity score for 1954, to June 1, stands at 721 wells drilled; of these 426 were oil wells, 46 were gas wells, and 249 were dry.

**This is the first of a series of articles on operations in western Canada by Frank J. Gardner, exploration editor of The Oil and Gas Journal. The series will present the latest information on what may develop into the world's biggest oil field—Pembina—and will also cover current developments of interest in other portions of the Prairie Provinces.**

Alberta was the leader in activity, with 426 wells, including 281 oil, 30 gas, and 115 dry, followed by Saskatchewan with 196 wells, of which 82 were oil, 8 gas, and 106 dry.

Manitoba has recorded 63 oil wells and 23 dry holes in 1954, while British Columbia reported 8 gas wells and 2 dry holes. In the Northwest Territories, 3 dry holes have been drilled this year.

A reflection of the effect of bad weather is found in the completion scores for the last week of May, when Saskatchewan outstripped Alberta two to one. In southern Saskatchewan, where most of that province's activity

## WESTERN CANADA TODAY—A RECAPITULATION

**RESERVES**

| | |
|---|---|
| Proven oil reserves (thousands of barrels)* | 3,042,000 |
| Estimated oil reserves of Athabasca tar sands (thousands of barrels) | 250,000,000 |
| Estimated proven gas reserves (billion cubic feet) | 17,500 |

**DEVELOPMENT**

| | |
|---|---|
| Land under lease or option (acres) | 107,000,000 |
| Estimated exploration and development expenditures (dollars per year) | 365,000,000 |
| Active geophysical crews | 175 |
| Drilling rigs in operation, June 1† | 143 |
| Newly located wells (not yet active), June 1 | 210 |

**PRODUCTION**

| | |
|---|---|
| Daily average crude-oil and natural-gasoline production (bbl.) | 259,000 |
| Daily potential crude-oil production (bbl.), June 1 | 402,500 |
| Daily average natural-gas production (M.c.f.), June 1 | 330,000 |
| Number of oil wells capable to produce, June 1 | 5,876 |
| Number of gas wells capable to produce, June 1 | 577 |

*Includes estimate of 1 billion barrels at Pembina. †Because of weather and road conditions, only 121 of these are actually operating.

centers, roads and lease conditions are improving faster than in Alberta.

**Pembina mud-bound . . .** In the Pembina field area, where 1954 developments have revealed a billion-barrel reserve, active rigs are few.

The field lies near the center of the muskeg country and, even in dry weather, is difficult to reach with heavy equipment. At the moment, frost lies 6 in. below the surface, but when summer comes, the thaw brings only more mud.

The area lies within a great clay-covered basin, with no outlet or drainage. Above the clay is a layer of humus and leaf-mold averaging 5 to 6 ft. in thickness, and in the best of summer weather, transportation is treacherous. The Northern Alberta Railway crossing the area must slow its trains to 8 m.p.h. to avoid creeping of the tracks and ties.

Operators of drilling wells compare it to the swamp areas of some parts of the southern United States; they are thinking now in terms of "mud-barges" or mudboats to be literally dragged along the surface of the muskeg to well locations.

**Vital Pembina tests "tight" . . .** Meanwhile, although operations are mud-bound, the vital Cardium sand tests being drilled by Imperial Oil, Ltd., in the northwestern part of Pembina field are well past the pay horizon.

Their findings, however, are completely unknown because the operators have released no information on these six key wells. If any one of them should find commercial Cardium oil, millions of barrels of oil would be added to Pembina reserves.

Oil men in Alberta are beginning to compare Pembina to Texas' sprawling Spraberry field; in area, it will probably be larger than either East Texas field or the Spraberry Trend. Reservewise, the answer is still in doubt. Porosities and permeabilities are low, and most wells are fractured before they are put on production, but the field may make up in area what it lacks in per-acre productivity to become the largest in North America.

Briefly the situation in western Canada can be summed up in the frustrated comment of one major service-company chief: "Here we have found what we believe to be the biggest oil field on the continent . . . and we can't get to it!"

## Gas Extension Tests Oil

REGINA, Sask.—The team of Husky Oil & Refining, Ltd., and Phillips Petroleum Co. has recovered water-free high gravity oil in drill-stem tests of the Viking sand in a well that was drilled as a gas extension in the Coleville area of west-central Saskatchewan.

The well is Husky-Phillips St. Florence 2 located 1¼ miles southwest of the Phillips-Husky St. Florence 1 which found gas in both the Viking and Blairmore with an open flow potential of 24,000 M.c.f. per day. The new well is 5 miles southeast of the nearest producer in the Smiley Viking field and 12 miles northwest of Kindersley.

Top of the Viking was encountered at 2,231 ft. In a drill-stem test of the 2,229-49 ft. interval, gas reached the surface in 2 minutes, and recovery was 900 ft. of water-free, light green to brown gassy 34° gravity oil. Shut-in pressure was 840 psi.

Phillips leased the section on which the well is located in a crown reserve lease sale April 23, 1954, for $3,238 or about $5 an acre.

# Bright Future Seen

### Alberta expects to profit by gas exporting, Pembina

EDMONTON, Alta.—With major obstacles cleared away for the export of the province's natural gas, a bright future is in prospect for Alberta's oil industry, according to the recently published provincial government's oil review for 1953.

The review says delays in the government's decision to export natural gas and tight competition for new capital were factors which prevented oil development from increasing its rate of growth during 1953.

Although crude production increased about 30 per cent in 1953, there were decreases in the number of operating drilling rigs and the number of new producing oil wells.

During 1953, there were 884 oil wells brought into production, compared with 946 in 1952. In December 1953 there were 118 rigs operating, compared with 158 in December 1952.

The report termed 1953 "a year of disappointments" that reduced the rate of natural gas and oil development and exploration. Toward the end of 1952, it said, there was "some pessimism over the lack of new discoveries of the size and productivity of Leduc and Redwater."

**Pembina . . .** By the latter part of 1953, the picture had brightened with the discovery of important cardium sand production in the Pembina area.

"As a result of the Pembina discovery, there is feverish activity in the huge area extending northwest and southeast from the original discoveries," the report said. "The new area is being talked up as the greatest in western Canada."

Estimates of the recoverable crude-oil reserves in the Pembina region range from 762,000,000 bbl. to 952,000,000 bbl., the report said. Even with the lowest estimate, Pembina is the largest oil field in Canada since Redwater, which was discovered in 1948.

In predicting a bright future for the Alberta oil industry, the review notes that there are 770,000 sq. miles of land under exploration in Alberta.

## Refinery Contract Let

EDMONTON, Alta.—Contract for the $4,000,000 expansion of the McColl-Frontenac Oil Co., Ltd., refinery here has been awarded to Canadian Kellogg Co., Ltd. Work on the expansion is scheduled to start this month. The job will be completed in 14 months.

# Demand Forecast Dips

## Revised Bureau of Mines figure is 137,000 bbl. below original forecast; poor first quarter held responsible

ESTIMATES of total demand for crude and products in 1954 were reduced 137,000 bbl. daily or 1.64 per cent by the revised forecast of the Bureau of Mines.

Total demand is expected to average 8,203,000 bbl. daily compared with a forecast of 8,340,000 bbl. daily last December.

The reduction of 137,000 bbl. daily represents a drop of 148,000 bbl. daily in the estimate of domestic demand and the upward revision for exports, amounting to 11,000 bbl. daily.

A large part of the cutback was in the first quarter of the year and was the result of warmer-than-normal weather and reduced consumption of heating oils.

Actual domestic demand in the first quarter was 8,283,000 bbl. daily or 250,000 bbl. daily less than estimated in the bureau's December forecast. The forecast for the second quarter was reduced 104,000 bbl. daily. The revision for the third quarter was the smallest for the year, down only 51,000 bbl. daily. Demand for the fourth quarter is expected to be 184,000 bbl. daily less than the December estimate.

Revisions in estimates of product demand are not shown by direct comparison of the two reports. The current forecast is on the new basis with all data for jet fuel broken out and shown as a new product. Components of jet fuel were included in the data for gasoline, kerosine, and distillate fuel in the December forecast.

The breakdown of jet-fuel production last year indicated that about 70 per cent of the total was included in gasoline production, about 10 per cent in kerosine, and 20 per cent in distillate.

If this breakdown is applied to the current estimate of 141,000 bbl. daily for jet fuel and the components deducted from the original product estimates, the new forecast shows the following demand cuts in thousands of barrels daily; gasoline 32, kerosine 13, distillate 41, residual 46, and other 16.

The latest forecast and percentage changes from last year are shown in the following table:

### Bureau of Mines Forecast — Supply and Demand

(Thousands of barrels daily)

| | First quarter | | Second quarter | | Third quarter | | Fourth quarter | | Year 1954 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Volume | Per cent increase over 1953 | Volume | Per cent increase over 1953 | Volume | Per cent increase over 1953 | Volume | Per cent increase over 1953 | Volume | Per cent increase over 1953 |
| **Domestic demand** | **8,283** | **2.8** | **7,434** | **1.2** | **7,457** | **2.9** | **8,359** | **6.1** | **7,882** | **3.3** |
| Gasoline | 3,084 | 2.9 | 3,576 | 2.6 | 3,631 | 3.8 | 3,359 | 3.7 | 3,414 | 3.3 |
| Kerosine | 488 | 4.8 | 193 | | 190 | 4.2 | 457 | 9.9 | 332 | 5.7 |
| Distillate | 2,021 | 9.4 | 1,089 | 2.8 | 967 | 4.7 | 1,717 | 11.7 | 1,446 | 8.0 |
| Residual | 1,677 | — 5.0 | 1,397 | — 5.8 | 1,305 | — 4.3 | 1,609 | 1.6 | 1,496 | — 3.3 |
| Jet fuel | 111 | 53.8 | 131 | 41.7 | 150 | 46.8 | 172 | 54.9 | 141 | 49.3 |
| Other | 902 | — 0.9 | 1,048 | 1.1 | 1,214 | 3.1 | 1,045 | 5.7 | 1,053 | 2.4 |
| **Exports** | **331** | **—22.4** | **327** | **—25.4** | **320** | **—11.7** | **304** | **—20.2** | **321** | **—20.2** |
| Gasoline | 82 | —21.5 | 85 | —19.8 | 86 | —20.0 | 76 | —23.1 | 82 | —21.1 |
| Kerosine | 20 | 5.9 | 19 | —29.2 | 16 | | 10 | —37.5 | 16 | —16.7 |
| Distillate | 54 | —48.4 | 56 | —43.3 | 66 | — 3.2 | 66 | —21.1 | 61 | —31.9 |
| Residual | 73 | 8.2 | 70 | — 3.0 | 54 | —21.9 | 54 | —29.6 | 63 | —12.2 |
| Jet fuel | | | 1 | | 2 | | 2 | | 1 | 25.0 |
| Other | 102 | —22.0 | 96 | —27.5 | 96 | — 3.3 | 96 | — 9.3 | 98 | —16.7 |
| **Total demand** | **8,614** | **1.5** | **7,761** | **— 0.3** | **7,777** | **2.2** | **8,663** | **4.9** | **8,203** | **2.1** |
| Gasoline | 3,166 | 2.1 | 3,661 | 2.0 | 3,717 | 3.1 | 3,435 | 2.9 | 3,496 | 2.5 |
| Kerosine | 508 | 4.8 | 212 | — 3.5 | 206 | 3.8 | 467 | 8.0 | 348 | 4.4 |
| Distillate | 2,075 | 6.3 | 1,145 | — 1.1 | 1,033 | 4.2 | 1,783 | 10.0 | 1,507 | 5.5 |
| Residual | 1,750 | — 4.5 | 1,467 | — 5.7 | 1,359 | — 5.2 | 1,663 | 0.1 | 1,559 | — 3.7 |
| Jet fuel | 111 | 53.8 | 132 | 39.5 | 152 | 45.8 | 174 | 56.9 | 142 | 49.0 |
| Other | 1,004 | — 3.5 | 1,144 | — 2.2 | 1,310 | 2.6 | 1,141 | 4.3 | 1,151 | 0.4 |
| **Stock change** | **—423** | | **356** | | **432** | | **—217** | | **38** | |
| Crude | — 53 | | 86 | | —11 | | | | 5 | |
| Products | —370 | | 270 | | 443 | | —217 | | 33 | |
| **New supply** | **8,191** | **— 1.5** | **8,117** | **— 0.7** | **8,209** | **— 0.1** | **8,446** | **5.3** | **8,241** | **0.8** |
| **Imports** | **1,123** | **1.6** | **999** | **— 4.9** | **978** | **1.0** | **1,163** | **8.1** | **1,066** | **1.5** |
| Crude | 631 | 1.8 | 645 | — 5.2 | 658 | — 1.0 | 685 | 9.0 | 655 | 1.0 |
| Products | 492 | 1.4 | 354 | — 4.5 | 320 | 5.4 | 478 | 6.8 | 411 | 2.3 |
| **Production** | **7,068** | **— 1.9** | **7,118** | **— 0.1** | **7,231** | **— 0.2** | **7,283** | **4.9** | **7,175** | **0.3** |
| Crude | 6,376 | — 2.6 | 6,448 | — 0.4 | 6,528 | — 0.8 | 6,544 | 4.6 | 6,474 | 0.1 |
| Other oils | 692 | 5.1 | 670 | 3.6 | 703 | 6.1 | 739 | 7.6 | 701 | 5.6 |
| **Runs to stills** | **6,977** | **— 0.4** | **6,926** | **— 0.4** | **7,113** | **0.2** | **7,146** | **3.0** | **7,041** | **0.6** |
| **Demand for domestic crude** | **6,439** | **— 1.2** | **6,368** | **— 0.7** | **6,543** | **0.3** | **6,543** | **2.3** | **6,474** | **1.1** |

# Tanker Fleet Born

## U. S. protest of Onassis-Saudi Arabian deal disclosed as world's largest tanker slides out of Hamburg shipyards

THE first ship for the new A. S. Onassis-Saudi Arabian tanker fleet has been launched in Germany amid increasing concern in the oil and ocean-shipping industries over the preferential contract obtained by the Greek shipowner.

The tanker, a 47,000-ton vessel, was launched in Hamburg at the Howaldt Yards. It flew the green flag of Saudi Arabia and was christened King Ibn Saud I, using holy water from Mecca instead of the traditional champagne, which is forbidden in the Moslem religion.

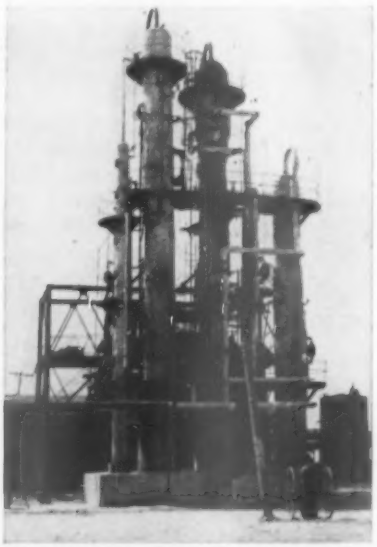
The tanker ranks as the world's largest now afloat. It is 780 ft. long and is too large to pass through the Suez Canal when fully loaded. Its speed is 17 knots, and among other features, it has elevators between engine room and crew quarters and a swimming pool.

Onassis and the Government of Saudi Arabia are partners in the new Saudi Arabian Tanker Co. which was established under the agreement signed several months ago and confirmed by royal decree in April *(The Oil and Gas Journal, February 22, page 126, and May 24, page 137)*. Features of the agreement giving certain preference to Onassis tankers in the movement of Saudi Arabian oil have been widely attacked.

**State Department protests . . .** State Department protests against the agreement were disclosed last week. Rep. Emanuel Celler (Democrat, New York) made public a letter from the department expressing the opinion the agreement violated terms of the concession agreement with Arabian American Oil Co.

The State Department acknowledged it had not yet obtained an official copy of the agreement, and it is also understood that none has been seen by the interested oil companies. The State Department said "on the basis of available information, our embassy in Saudi Arabia has expressed to the Saudi Arabian Government our concern over the agreement which appears to the U. S.

**THIS BLANKET-WRAPPED DERRICK is located in Red China's only oil-producing field, Yumen field, about 800 miles west of Peiping. These photographs were supplied by Eastfoto, a Communist China Photo Service.**



**THIS "RENOVATED AND ENLARGED" distillation plant is a portion of the refinery at Yumen field.**

# Oil Behind China's Bamboo Curtain . . .

AS far as is known, Communist China has but one oil producing area, Yumen field, despite stepped-up exploratory activity.

This lone field, which is about 800 miles due west of Peiping, is disadvantageously located away from main consuming areas. Western observers estimate that Yumen field may be producing as much as 4,000 bbl. daily. Red China officials recently announced they plan to double the area's production in 1954 by doubling capital expenditures in the Yumen area. Eighty per cent of the expenditures will go for drilling.

Most of the crude is refined at Yumen, which also has facilities for producing lubricating oil. The remainder is shipped to eastern China.

West of Yumen, in Sinkiang, exploration is being carried out by a joint Russian-Chinese company formed in 1952. The state-owned Chinese Petroleum Corp. has been exploring elsewhere in China, including the southern part of the country. Several thousand barrels daily of oil products also are produced in China from coal and shale, but the larger part of the country's requirements are met by imports through Russian and Eastern European sources.

Government not to be in keeping with the concession agreement concluded between the Saudi Arabian Government and the Arabian American Oil Co."

**Arabian view . . .** In a statement made at Hamburg at the launching of the new tanker, Shaikh Mohammed Abdullah Ali Reza, Saudi Arabian minister of commerce, said his government had no plans whatsoever to nationalize its oil industry. He said the government was "very satisfied" with Aramco's operations and saw no reason to end this "mutually profitable cooperation."

**Onassis denies charges . . .** Earlier, in New York, Onassis denied that the agreement would constitute a monopoly in shipping Saudi Arabian oil, that it called for flag discrimination, or that it would add to the cost of Saudi Arabian production.

He said first priority in furnishing tankers would be the concessionaire company, its partners and buyers, and next to the new Saudi Arabian tanker company.

# New Iranian Talks Held

## Consortium leaders meet in London to discuss objections of Zahedi government; wide split over issues indicated

TOP oil-company executives were meeting last week in London to consider objections of the Iranian Government to their proposals for an oil settlement.

The officials represent the eight companies in the international oil consortium which was formed earlier this year to reactivate the nationalized and virtually shut-down Iranian oil industry.

Leaders of the negotiating mission, which the consortium sent to Iran in mid-April returned to London for talks with the heads of their own companies after it became apparent the Iranian Government was not prepared to accept the terms originally offered. This negotiating group was headed by Orville Harden, Standard Oil Co. (N.J.), and included H. E. Snow, Anglo-Iranian Oil Co., Ltd., and J. H. Loudon, Royal Dutch-Shell.

Executives of the consortium companies who were participating in the London discussions, in addition to the negotiators, were: Howard Page, Jersey Standard; Robert Siegel, Socony-Vacuum Oil Co., Inc.; R. G. Follis, Standard Oil Co. of California; A. C. Long, The Texas Co.; Sidney Swensrud, Gulf Oil Corp.; Sir William Fraser, N. A. Gass, and J. M. Pattinson, Anglo-Iranian; Sir Francis Hopwood, Royal Dutch-Shell; and M. de Grouchy, Cie. Francaise des Petroles.

**Split on management . . .** Reports from both London and Teheran indicated that several serious differences separated the views of the Iranian Government and the oil consortium. Apparently the course which the negotiations were taking reflected more trouble than could be attributed simply to hard, tough bargaining.

The two sides seemed to be widest apart on the matter of management. The consortium's insistence on control of the operation in the interests of efficient and nonpolitical management runs counter to the Iranian oil nationalization law.

The Zahedi government feels that its agreement to foreign management might stir up new outbreaks of violent nationalism in Iran. Talk now is of the possibility of a compromise which would provide a board giving effective control to the consortium yet responsible in various ways to the Iranian Government.

**Other differences . . .** Several other issues are in dispute. Iranian Government officials are understood to have put forward a set of counter claims against Anglo-Iranian which are completely unacceptable. The Iranians are asking the £49,000,000 ($137,200,000) which Anglo-Iranian agreed to pay 4 years ago had the government accepted its concession-revision agreement at that time. Furthermore, the Iranian Government is said to be demanding a share in all assets of Anglo-Iranian.

Other points of difference are the volume of production which the consortium proposes to provide, the price at which the oil will be sold, and the plan for under-capacity operations at Abadan in view of the surplus of refining capacity built since this huge plant was closed.

The consortium expects to step up Iranian production gradually as it can be reintroduced into world markets. The Iranians want a more spectacular increase. The Iranians are said to be unable to accept the fact that during the prolonged shut-down the markets for Abadan's refined products have been more or less permanently lost.

High-level government efforts were being made to get the negotiations back on the track.

## Aramco Supplies Desert Market

**Although Arabian American Oil Co. is properly regarded as an oil-producing company, it also meets requirements of local markets within Saudi Arabia. Since the war, bulk plants and retail outlets have been built at various points through the desert kingdom, and the company's products sales amount to more than a million barrels annually. The Arab workmen, above, service an automobile in a station at Jeddah on the Red Sea coast. The station is owned by a private Saudi Arab businessman.**

# Gas Line Assured

## International Bank approves loan for 350-mile pipeline in West Pakistan; pipe ordered, May completion planned

CONSTRUCTION of a 350-mile pipeline outlet for natural gas from the 1952 Sui gas field discovery in West Pakistan has been assured with the approval of a $14,000,000 loan for the project by the International Bank for Reconstruction and Development.

The loan provides the bulk of the estimated £9,000,000 ($25,200,000) cost of the undertaking. Eastern Exchange Banks, a group of six private British banks doing business in Asia, has agreed to participate, without the International Bank's guarantee, to the extent of £645,000, or $1,806,000.

The loan was made to the Sui Gas Transmission Co., Ltd. One-quarter interest in this newly-formed company is held by the Pakistan Industrial Development Corp., slightly more than a quarter by the Burmah Oil Co., Ltd., and the Commonwealth Development Finance Co., Ltd., of the United Kingdam, and the remainder by private investors in Pakistan. The original application for the loan was made last year. During negotiations, W. E. V. Abraham, managing director of B.O.C., flew to Washington to present the project to the bank's directors.

**Proposed plans . . .** The project calls for a 16-in. line from Sui field to Karachi via Sukkur and Hyderabad through the lower Indus River Valley, together with connecting lines to several large consumers *(A map of the route was published in The Oil and Gas Journal, February 22, page 127).*

The British firm of Stewarts & Lloyds has an order to supply the pipe, and target completion date is next May. The line is scheduled to move 37,000,000 cu. ft. initially. Capacity using well pressures is 70,000,000 cu. ft. Compressors later will provide for transmission of up to 110,000,000 cu. ft., the design capacity of the line.

**Big reserves . . .** Reserves at Sui are now estimated at more than 2¼ trillion cu. ft., enough for 110,000,000 cu. ft. daily for 50 years. The field discovery was made by Pakistan Petroleum, Ltd., which is owned 70 per cent by B.O.C. and nearly 30 per cent by the Pakistan Government. P.P.L. will sell gas at the field to Sui Gas Transmission Co. When the system is completed, Burmah Oil Co. (Pakistan Trading) Ltd., a subsidiary of B.O.C., will act as managing agents for the transmission company under a 20-year contract.

The Sui system will provide the only long-distance pipeline for natural-gas transmission in Eastern Asia. In its first year, the line will provide the equivalent in fuel value of some 500,000 tons of coal. The gas will be taken by industries, including power plants, cement works, cotton textile, and other factories.

# Cuba Has Oil Fever

## Jatibonico discovery sparks new plans for more drilling

DISCOVERY of what promises to be important oil production in Cuba last month has revitalized oil interest in several parts of the country.

The Jatibonico discovery well, near the Las Villas and Camaguey province boundary line, is still flowing at more than 100 bbl. daily. This well has attracted foreign companies and several other drilling programs are now in the planning stage.

Cuban Venezuelan Oil Voting Trust, a consolidation of 24 small units organized as a trust to comply with Cuban land laws, holds large areas in the vicinity of the Jatibonico well. It announced recently it has signed a contract with Trans-Cuba Oil Co. making some of the trust's large areas available to Trans-Cuba.

Trans-Cuba, closely allied with the trust, claims stock sales of $1,500,000 and is now dealing with Deep Rock Oil Corp., Tulsa, regarding a drilling program.

**Gulf active . . .** Gulf Oil Co. of Cuba, which some time ago abandoned most of its holdings along the north coast, has gone ahead with its exploration work near Placetas in Las Villas province. Placetas is about 40 miles northwest of the Jatibonico production. Gulf has evidently embarked on a serious long range program in the area.

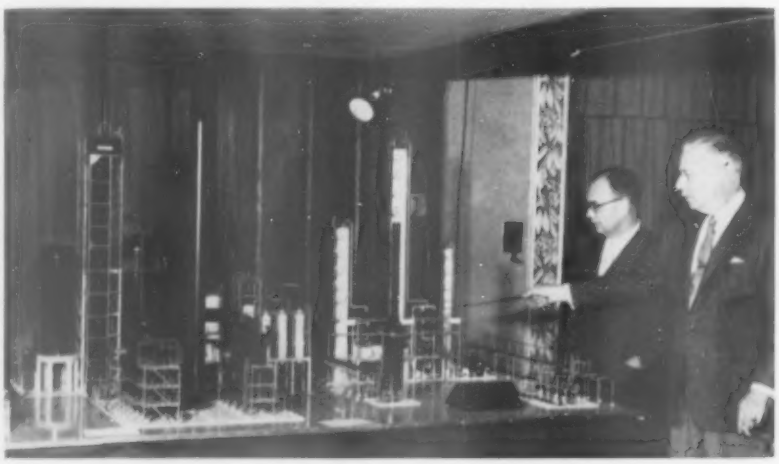
The government-owned National 75 rig used at Jatibonico will move within the next month to Jarahueca, a shallow field lying a few miles north of a line drawn between Placetas and Jatibonico.

## Peru Test Successful

Douglas Oil Co.'s first effort to develop extensive properties in northern Peru resulted in a 30-bbl. well.

The producer, Douglas 1 Lobitos, was slant drilled to a depth of 7,020 ft. from a site on the beach. It was bottomed offshore at a vertical depth of 5,500 ft.

Location is near Talara, on a 1,000-acre concession covering offshore drilling rights the company obtained from the British firm, Compania Petrolera Lobitos. The well, however, was bottomed in the adjoining Pacifico concession where Douglas has rights to about 122,000 acres.



## Scale Model of Refinery Proves Valuable

**This model of Creole Petroleum Corp.'s 11,000-bbl. fluid Hydroformer now building at Amuay Bay, Venezuela, is considered worth the $25,000 it cost. It eliminated much drafting and blueprinting during the design stage and is expected to be useful in the next few months in training personnel. The unit is scheduled for completion in January. C. H. Cole, Creole's assistant manager of refining, points out some aspects of the model to Eric Luster, vice president for Standard Oil Development Co., which designed the unit.**

# 5,000-bbl. HORTONSPHEROIDS

## in use at North Cowden

Take a toy balloon, fill it with water and air under pressure and lay it on a table. Note that the pressure tends to make the balloon spherical but that the weight of the liquid flattens it into a spheroidal shape. A Hortonspheroid is actually a modification of this natural shape and is especially well adapted to the storage of natural gasolines and motor gasolines.

Hortonspheroids® are proving their efficiency every day by reducing evaporation losses caused by breathing, filling or boiling. With the exception of the relief valves and gages a Hortonspheroid has no moving parts and is entirely free from operating difficulties due to severe weather conditions. Maintenance costs are reduced to a minimum with inspection and painting only normally being required.

Hortonspheroids are available in standard capacities from 2,000 to 120,000-bbls. Write our nearest office for further information, estimates or quotations. There is no obligation.

Above: Three 5,000-bbl. Hortonspheroids used for the storage of natural gasoline at the North Cowden natural gasoline plant near Odessa, Texas. This plant, operated by the Stanolind Oil and Gas Co. for a group of twenty-one owners, provides facilities for one of the world's largest gas injection programs.

# CHICAGO BRIDGE & IRON COMPANY

*Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA*

| | | | | | |
|---|---|---|---|---|---|
| Atlanta, 3 | 2154 Healey Bldg. | Detroit, 26 | 1514 Lafayette Bldg. | Pittsburgh, 19 | 3228 Alcoa Bldg. |
| Birmingham, 1 | 1536 North 50th St. | Houston, 2 | 2119 C & I Life Bldg. | Salt Lake City, 4 | 525 West 17th South St. |
| Boston, 10 | 1025-201 Devonshire St. | Los Angeles, 17 | 1523 General Petroleum Bldg. | San Francisco, 4 | 1554-200 Bush St. |
| Chicago, 4 | 2128 McCormick Bldg. | New York, 6 | 3347—165 Broadway Bldg. | Seattle, 1 | 1325 Henry Bldg. |
| Cleveland, 15 | 2204 Midland Bldg. | Philadelphia, 3 | 1615-1700 Walnut Street Bldg. | Tulsa, 3 | 1606 Hunt Bldg. |

*REPRESENTATIVES AND LICENSEES*

Horton Steel Works Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprimo N. V. 21, Amstel, Amsterdam (C) Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Av. General Justo, 275, Grupo 306, Rio de Janeiro, Brazil

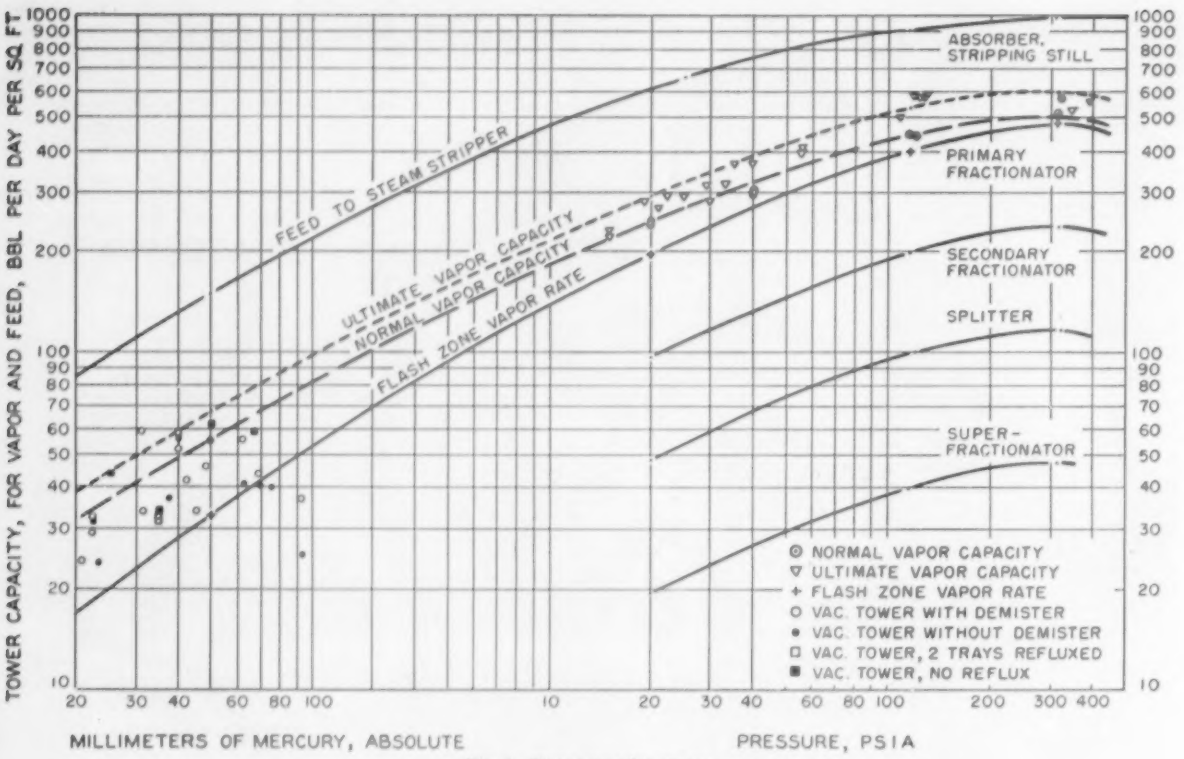



Fig. 1—Vapor-capacity curves.

*Here's a new correlation for . . .*

# Sizing Refinery Fractionating Equipment

*Part 1 of 2 parts*

**by G. T. Atkins and G. W. Wilson**

QUICK preliminary estimates for sizing of fractionating equipment can be organized to better advantage, and can be improved in reliability, by the use of correlations which show fractionation-equipment size and capacity for various services, plotted as a function of the operating pressure. This paper presents such a classification, together with one or two illustrations. No pretension to completeness of coverage is made; i.e., the present effort is confined to making a start and showing a few results.

### Operating Pressure

The operating pressure has a great deal to do with tower capacity; i.e., the higher capacities are realized at the upper levels of pressure. But there is an optimum pressure which should not be exceeded. One reason is that more heat is required to vaporize the feed stock, and higher temperatures must be maintained in the stripping section of the tower. For any particular service, the temperature and pressure are usually fairly well determined by the composition of the distillate and the tem-

Authors are with Humble Oil & Refining Co., Baytown, Tex. Paper presented during midyear meeting of the American Petroleum Institute's Division of Refining, Houston, May 13, 1954.

**This article presents a rapid method for determining the size of fractionation equipment which might be used to perform a proposed distillation duty. The feed rate per square foot of tower cross-section is read directly from a correlation of tower capacity vs. operating pressure. Degree of fractionation is another variable for which a relative scale is set up according to reflux requirements. Thus feed rate is related to tower size. The ultimate (maximum allowable) vapor capacity for a number of refinery towers has been used to establish an upper limit; but the normal (design) rating must be somewhat lower, according to the sensitivity of the process to entrainment.**

**The net heat requirement per unit of feed is related to the degree of fractionation, whereas the heat-transfer surface is related to both feed rate and to heat input.**

**An example showing the application of the curves in Fig. 1 will be presented in Part 2 to follow in an early issue.**

perature of the condensing medium. Hence, it is to be expected that the composition of the overhead fractions will have a controlling influence on both operating pressure and capacity. It is usually economical to select the lowest operating pressure which will still permit satisfactory condensation of the distillate and the reflux at normal cooling-water temperatures.

### Normal Vapor Capacity

In order to show the normal vapor capacity as a function of operating pressure, a sequence of cases was assumed in which vapor rates and tower sizes were found for various pairs of light hydrocarbons. In each case it was assumed that the vapor rate in the stripping section of the tower, near the reboiler, was 10,000 bbl. per day. A tower size was then found which was sufficient for handling vapor and liquid at this point, with allowance for overcapacity (approximately 20 per cent) in accordance with usual design practice. The principal results are listed in Table 1, which shows the definite trend toward higher normal vapor rates when operation is at the higher pressures.

As a further point in defining the normal vapor capacity and its relation to the ultimate capacity, it should be noted that, for a good bubble-tray design, the pressure drop at the normal vapor capacity would be approximately 6 in. of hot liquid per tray. This compares with about 10 in. per tray at ultimate capacity.

**Low-pressure region . . .** In order to extend the comparison to the low-pressure region, a design was calculated for the vacuum distillation of a heavy reduced crude at a vapor rate of 10,000 bbl. per day of cracking stock of approximately 500 mol. wt., with 5,000 lb. per hour of steam and at flash-zone conditions of 740° F. and 1.5 psia. (3 in. absolute pressure). The corresponding partial pressure of the oil vapor was 50 mm. of mercury. The required tower diameter was found to be 15.2 ft., and the vapor capacity 55 bbl. per day per square foot of tower cross-section. This case permits the completion of the correlation of normal vapor capacity as a function of pressure.

**TABLE 1—NORMAL VAPOR CAPACITY VS. ABSOLUTE PRESSURE**

| Hydrocarbons— | Tower i.d. (ft.) | Operating press., psia. | Vapor rate, B/D per sq. ft. |
|---|---|---|---|
| n-Hexane, isoheptane | 7.2 | 20 | 245 |
| Isohexane, n-hexane | 7.3 | 20 | 241 |
| n-Pentane, isohexane | 6.5 | 40 | 304 |
| Isopentane, n-pentane | 6.5 | 40 | 298 |
| n-Butane, isopentane | 5.4 | 115 | 445 |
| Isobutane, n-butane | 5.4 | 120 | 440 |
| Propane, isobutane | 5.0 | 315 | 510 |
| Propylene, propane | 4.7 | 320 | 575 |
| Cracking stock (500 mol. wt.) residuum | 15.2 | (*) | 55 |

*Partial pressure of oil vapor, 50 mm. of mercury.

### Vapor Rate at the Flash Zone

When a feed stock is flashed, the vapors which are released are accompanied by entrained liquid. The amount of entrainment which eventually becomes associated with the distillate depends upon such things as vapor velocity, reflux ratio, and the number of trays.

**Entrainment . . .** In vacuum distillation, where the vapor velocities are high, there is a natural tendency for entrainment to be severe. This is further aggravated when there is insufficient reflux to maintain a tight seal on the trays just above the feed; but, if the distillation is at atmospheric pressure instead of under a vacuum, the superficial velocities are lower, so that even without reflux (or cleanup trays) the entrainment is not so severe. And for the pressure distillation of light hydrocarbons there is usually no need to be concerned with entrainment because of effective cleanup on the trays above.

**Correction factors . . .** These considerations as to entrainment lead to a scale of correction factors for derating vapor capacity at the flash zone (or feed tray) to the extent necessary to minimize entrainment to the trays immediately above the feed. The correction factor itself is also a function of operating pressure, as shown in Table 2. This results in a scale of vapor rates at the flash zone dependent factorwise upon the normal vapor capacity previously found as a function of pressure.

The entrainment limitation at the flash zone is common to all vacuum distillations for the recovery of lubricating-oil distillates or heavy catalytic cracking feed stocks, although there are differences from one case to another depending upon the acceptable degree of cleanliness of the overhead fraction and, likewise, upon the effectiveness of entrainment elimination.

**Mesh pads . . .** The symposium on "Use of Wire-Mesh Sections in Asphalt Entrainment Control in Vacuum Pipe Stills,"[1] which covers a wide range of operating experience, demonstrates that, unless adequate entrainment elimination is obtained, vacuum distillates tend to be dirty and tower capacity low; but that, with a suitable mist eliminator, the distillates are cleaner even at much higher rates.

A summary of those results is given in Table 3. In this table the vapor rate is shown as a function of the partial pressure of the oil vapor (which was

**TABLE 2—FLASH-ZONE VAPOR RATE VS. ABSOLUTE PRESSURE**

| Service— | Operating pressure, psia. | Normal vapor capacity, B/D per sq. ft. | Correction factor | Flash-zone vapor rate, B/D per sq. ft. |
|---|---|---|---|---|
| Vacuum distillation: | | | | |
| Flashing residuum | (*) | 55 | 0.6 | 33 |
| Atmospheric distillation: | | | | |
| Flash zone of pipe still | 20 | 243 | 0.8 | 195 |
| Pressure distillation: | | | | |
| Naphtha stabilization | 115 | 445 | 0.9 | 400 |
| Splitting hydrocarbons | 315 | 500 | 0.95 | 475 |

*Partial pressure of oil vapor, 50 mm. of mercury.

**TABLE 3—ENTRAINMENT LIMITATION OF VACUUM PIPE STILLS**
(With* and without demisters)

| Authors— | Inside diam., ft. | Pressure, mm./Hg | Feed, B/D | Vapor rate— B/D | Vapor rate— B/D per sq. ft. |
|---|---|---|---|---|---|
| J. S. Corlew | 8.5 | 38 | 2,750 | 2,126 | 37 |
| | *8.5 | 31 | 4,200 | 3,322 | *59 |
| H. S. Fourer | 21.0 | 70 | 20,000 | 13,800 | 40 |
| | *21.0 | 40 | 26,500 | 18,000 | *52 |
| D. H. Stormont | 17.7 | 40 | 35,000 | 14,000 | 57 |
| | *17.7 | 40 | 35,000 | 14,000 | *57 |
| J. W. Russell | 20.0 | 24 | 15,000 | 10,150 | 32 |
| | *20.0 | 24 | 15,000 | 10,150 | *32 |
| J. H. Fisher and L. R. Bunger | 10.0 | 62 | 4,410 | 3,185 | 41 |
| | *10.0 | 62 | 6,050 | 4,365 | *56 |
| | 26.0 | 92 | 18,000 | 13,000 | 25 |
| | *26.0 | 92 | 27,000 | 19,500 | *37 |
| G. H. Gaumer | 24.0 | 75 | 36,400 | 18,000 | 40 |
| | *24.0 | 68 | 35,220 | 20,000 | *44 |
| | 15.0 | 26 | 17,839 | 4,200 | 24 |
| | *15.0 | 20 | 17,000 | 4,200 | *24 |

as an approximation taken equal to the total pressure at the flash zone). In each case the quality of the distillate was controlled by the presence or absence of adequate demisters.

Although the wire-mesh demisters are very effective for taking out entrainment, the eventual coking up of these pads, and the necessity of removing and replacing them, is also a factor to be considered. The premium associated with increased yields of clean distillate can ordinarily be expected to outweigh by far the recurrent cost of replacement of the mesh pads. Devices other than wire mesh, if capable of cleaning up the distillate, would also give a quick payout. However, a number of devices have been tried in the past without too much success. The closest contender in this field is the bubble-cap tray—provided, however, that special conditions are met to make the bubble tray operable. Some of these conditions are as follows:

1. Sufficient reflux must be provided to dilute and wash back the entrainment from below.

2. Two trays give a better cleanup than one.

3. Lightweight alloy should be used for resistance to corrosion and coking. Trays should be tight to leakage, and level between weirs.

4. Splash baffles should be provided ahead of the outlet weirs, or else the downcomers should be of a size not larger than approximately 0.2 per cent of the tower cross-section (so that the small amount of reflux will not be blown off the tray into the downcomer).

5. Vapor from the transfer line should enter tangentially, or downward, with sufficient control over the distribution so that liquid (asphalt) gets headed down instead of up.

6. Spacing between trays should be from 30 to 60 in.

Tests conducted on two similar vacuum flash towers at the Baytown refinery (of Humble Oil & Refining Co.)—with mesh pads in one and bubble trays in the other—showed once again that clean mesh pads give satisfactory results. However, these tests also showed that coked pads are of little, if any, benefit; and, similarly, that sound bubble trays, adequately refluxed, can make a first-quality distillate, but that leaky or dry trays have no effectiveness. The results are summarized in Table 4. If Table 4 is compared with Table 3, it can be seen that the vapor capacity and distillate quality realized are just about average. The point of interest is that satisfactory cleanup of the vapors can be obtained with suitable trays of bubble caps.

### Ultimate Vapor Capacity

Even in a large refinery there are often only a few towers which can be considered satisfactory illustrations of ultimate capacity. Even when a unit is pushed hard, equipment other than the tower internals may limit vapor capacity. It is not uncommon to find towers limited by reboiler or condenser surface or by pressure drop in the reboiler piping. Table 5 shows a few selected illustrations of ultimate vapor capacity from the Baytown refinery. Even though the group is handpicked, some of these towers still do not come up to topnotch performance—in a few cases because of excessive liquid loading, and in a few others because of inefficiencies in tray details; but, in a general way, they help to define a curve of ultimate vapor capacity as a function of tower pressure.

### Vapor-Capacity Curves

The three curves of "ultimate vapor capacity," "normal vapor capacity," and "flash-zone vapor rate" are shown in Fig. 1, together with points plotted from Tables 1 through 5. These relations, taken altogether, seem to constitute a fairly satisfactory standard for vapor rates in refinery bubble towers.

In the vacuum-distillation region the points above the curve for flash-zone vapor rate represent operations in which the level of entrainment tended to be objectionable; but, once the entrainment had been brought under control by suitable devices, a substantially greater capacity was realized, as typified by the curve of normal vapor capacity. And there was even a scattering of data points beyond this normal vapor capacity, thus illustrating ultimate vapor capacity as realized in some of the towers.

**Atmospheric crude distillation . . .** Experience with the atmospheric stage of crude distillation units shows a flash-zone vapor rate of about 200 to 235 bbl. per day per square foot of tower cross-section at flash-zone conditions averaging about 30 psia. partial pressure of the oil vapor. These rates at the flash zone result in still higher vapor rates in the refluxing zone higher up in the tower; thus the pressure drop across the trays becomes high, and certain sections reach an ultimate vapor-capacity limitation. Hence, the indicated flash-zone vapor rates are considered

**TABLE 4—ENTRAINMENT LIMITATION IN A VACUUM TOWER OF 25.0 FT. INSIDE DIAMETER**

(Wire-mesh pad vs. bubble-cap trays)

| Entrainment-elimination device at flash zone— | Entrainment, B/D | Partial pressure, mm./Hg | Feed, B/D | Net distillate— B/D | Net distillate— B/D per sq. ft. |
|---|---|---|---|---|---|
| One tray plus 4-in. mesh pad: | | | | | |
| End of run, pad coked | 360 | 45 | 25,865 | 16,700 | 34 |
| Pad new and clean | 170 | 48 | 36,820 | 22,300 | 46 |
| Pad new and clean | 200 | 42 | 31,870 | 20,700 | 42 |
| Pad new and clean | 70 | 31 | 24,200 | 16,600 | 34 |
| Pad new and clean | 130 | 24 | 20,050 | 14,050 | 29 |
| Two trays of bubble caps: | | | | | |
| With no reflux | 503 | 50 | 38,423 | 30,661 | 62 |
| With no reflux | 400 | 67 | 33,552 | 28,889 | 59 |
| With no reflux | 290 | 30 | 25,841 | 21,558 | 44 |
| With no reflux | 100 | 35 | 17,790 | 16,650 | 34 |
| With 420 bbl. per day of reflux | 50 | 35 | 17,800 | 16,470 | 33 |
| With 970 bbl. per day of reflux | 30 | 35 | 17,670 | 15,900 | 32 |

**TABLE 5—ULTIMATE VAPOR CAPACITY VS. TOWER PRESSURE**

| Service— | Location of trays limiting | Tower i.d. (ft.) | Partial pressure, psia. | Feed rate, B/D | Vapor rate, B/D | Vapor rate, B/D per sq. ft. |
|---|---|---|---|---|---|---|
| Crude unit | Circulating reflux | 15.5 | 15 | 46,500 | 41,000 | 220 |
| | Circulating reflux | | 15 | 46,000 | 44,000 | 230 |
| | Circulating reflux | | 30 | 70,500 | 53,000 | 280 |
| Cat. unit fractionator | Circulating reflux | 16.5 | 29 | 59,600 | 67,300 | 315 |
| Catalytic gasoline rerun | Above feed | 6.0 | 19 | 14,000 | 8,030 | 280 |
| Naphtha rerun | Below feed | 9.8 | 21 | 8,700 | 20,000 | 270 |
| Naphtha rerun | Above feed | 8.6 | 25 | 16,000 | 17,000 | 290 |
| Naphtha rerun | Above feed | 12.0 | 22 | 14,700 | 33,000 | 290 |
| Naphtha fractionator | | 7.0 | 33 | 5,300 | 12,100 | 315 |
| Hexane splitter | Above feed | 12.0 | 35 | 14,600 | 41,500 | 365 |
| Depentanizer | Heat input | 12.0 | 40 | 20,300 | 41,000 | 360 |
| Deisopentanizer | Heat input | 12.0 | 55 | 18,200 | 46,500 | 410 |
| Deisopentanizer | Below feed | 9.5 | 55 | 11,100 | 28,500 | 400 |
| Alkylate debutanizer | Heat input | 10.0 | 109 | 15,250 | 39,200 | 500 |
| Polymer debutanizer | Heat input | 5.0 | 125 | 9,630 | 11,300 | 575 |
| Butane splitter | Below feed | 8.5 | 117 | 8,300 | 33,000 | 580 |
| Butane splitter | Below feed | 10.0 | 118 | 10,700 | 44,500 | 570 |
| Butane splitter | Below feed | 10.5 | 130 | 8,850 | 51,600 | 590 |
| Depropanizer | Below feed | 9.0 | 345 | 20,000 | 33,000 | 520 |
| Depropanizer | Below feed | 8.0 | 390 | 15,000 | 28,000 | 560 |

the practical upper limit for operations in this category.

**Cat cracker fractionators . . .** The main fractionating tower of a catalytic cracking unit represents a somewhat comparable case, in that there is a good deal of superheat to be removed, and, hence, high flash-zone vapor rates result in an ultimate vapor-capacity limitation in the upper part of the tower. In a new unit the main fractionator would probably be sized to accommodate 150 to 200 bbl. per day of total feed per square foot of flash zone, at a total operating pressure of about 25 to 30 psia. However, in an existing unit pushed hard for capacity, about 250 bbl. per day at an operating pressure of 35 psia. might be more typical of results to be expected.

It is seen that the three aforementioned curves in Fig. 1 are in agreement with actual tower performance; and, in reverse, can be used to arrive at quick estimates of tower sizes based on vapor rates in the towers.

### Steam Strippers and Absorbers

Vapor limitation in strippers and absorbers is found as follows: When side cuts and bottoms are stripped with steam at the usual rates, it is possible to vaporize about 0.25 bbl. of oil for each barrel of stripped product. This corresponds to a temperature drop of about 40° F. for the oil which leaves the stripper. The temperature drop alone would reduce the vapor pressure to approximately 50 per cent of that at the inlet; but, in addition, the removal of volatile fractions by the steam would reduce further the tendency to vaporization. Thus, for the purpose in view, the normal vapor rate can be considered fixed in proportion to the feed to the stripper, which can then be sized to accommodate both vapor and liquid. First, an area can be calculated for handling the vapor such as would be used for flash-zone conditions. Then, to this, an additional area can be added to take care of the proportionately larger downcomers usually used in strippers. The procedure is illustrated in Table 6.

In absorbers, from the point of view of capacity, the situation is somewhat similar to that which has already been described for strippers. Size is based on the quantity of rich oil. Once this has been estimated, an approximation can be made of the size absorber required. The general size expectation for new design is approximately in accordance with the upper curve in Fig. 1.

### Fractionation

With a fixed tower size and fixed capacity for handling vapor and liquid, the normal feed rate will depend upon how much of the capacity is used up by fractionation for making the desired separations. If there is only a little refluxing, the feed capacity will be high; but, if sharp separations are to be made, most of the tower capacity will be used up by refluxing and reboiling, and the allowable feed rate will be correspondingly reduced. As a rough guide to judging the feed capacity of a unit, five types of service are defined in Table 7; these types progress in degree of rectification so as to form a scale of comparison by which other operations may be classified. Table 7 serves not only to generalize a considerable amount of refinery experience, but also to permit estimates of sizes and capacities for similar operations.

The classification in Table 7 will now be discussed further for the purpose of amplifying the meaning of the terminology used.

**Stripping still . . .** This would be suitable for such operations as "flashing" part of the light naphtha from crude oil, or recovering absorption naphtha from rich oil. The vapor rate would be only a fraction of the total feed rate, and capacity would be typically represented by the upper curve in Fig. 1. About 10 or 20 trays might be used, with reflux returned to the top tray. The rectifying section would normally be of a smaller diameter than the stripping section. The fractionation would be poor, with wide overlapping of components. If sharper separation were desired, the tower should be chosen of uniform diameter from top to bottom; the feed should be brought in partly flashed; and the reflux rate should be increased up to the capacity of the rectifying section. But, even so, some overlapping of fractions would still be found.

**Primary fractionator . . .** This would have sufficient heat-input capacity to vaporize the feed, or to do a proportionate amount of refluxing and reboiling. As a definition, let the controlling vapor rate be considered equal to the feed rate. Stabilizers fall in this class, the controlling vapor rate being found just above the reboiler. A second example would be a rerun tower which takes half the feed overhead at an internal reflux ratio (L/D) of 1:1. Still another example would be an evaporator or a fractionating tower with the feed completely vaporized, and with overhead distillate or side cuts being taken.

**Secondary fractionator . . .** This would be used for a still better degree of fractionation, but at a relatively lower feed rate. A typical feed stock would be the distillate or bottoms from a primary fractionator, and a typical product would be a single hydrocarbon fraction, viz.: $C_3$, $C_4$, or $C_5$, including the isomers. Alternatively, just the isomer might be taken overhead if it were the lightest component of a wide naphtha mixture, say stabilizer bottoms. The feed rate would be about 50 per cent of the vapor rate, and tower utilization above and below the feed tray should be balanced by adjustment of the preheat temperature. A curve to represent the capacity is shown in Fig. 1.

**Splitter . . .** This has a still lower feed rate, viz., here taken equal to 25 per

*(Continued on page 122)*

**TABLE 6—STRIPPERS AND ABSORBERS**

(Stripper feed or absorber rich oil, 10,000 bbl. per day. Stripper product or absorber lean oil, 8,000 bbl. per day. Vapor rate, 2,000 bbl. per day)

| Service— | Operating pressure, psia. | Areas required— For vapor | For liquid | Total | Feed rate (rich oil) B/D per sq. ft. |
|---|---|---|---|---|---|
| Vacuum distillation: | | | | | |
| Residuum and side cuts | (*) | 60.7 | 6.0 | 66.7 | 150 |
| Atmospheric distillation: | | | | | |
| Bottoms and side cuts | 25 | 9.2 | 6.0 | 15.2 | 660 |
| Absorbers: | | | | | |
| Low pressure | 115 | 5.0 | 6.0 | 11.0 | 910 |
| High pressure | 315 | 4.1 | 6.0 | 10.1 | 990 |
| Field natural gas | 1,500 | 4.0 | 6.0 | 10.0 | 1,000 |

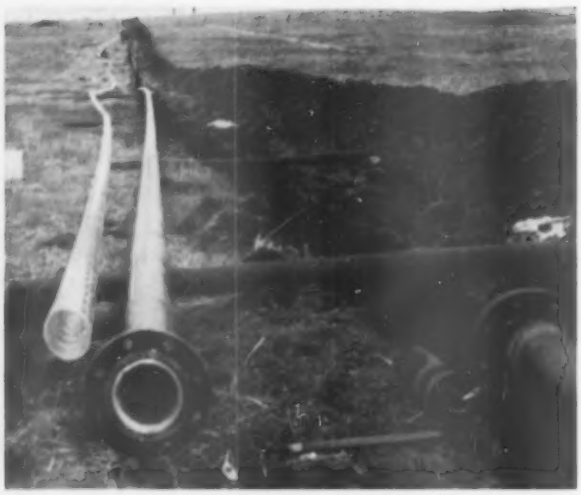
*Partial pressure, 50 mm. of mercury.

**TABLE 7—CLASSIFICATION BY DEGREE OF RECTIFICATION**

Typical Number of Trays.
Ratio of Vapor Rate to Feed Rate.

1. Stripping still:
   10 to 20 trays
   Vapor = 20 per cent of feed
2. Primary fractionator:
   20 to 40 trays
   Vapor = feed
3. Secondary fractionator:
   40 to 50 trays
   Feed = 50 per cent of vapor
4. Splitter:
   50 to 70 trays
   Feed = 25 per cent of vapor
5. Superfractionator:
   70 to 100 trays
   Feed = 10 per cent of vapor

**1** First step of installation is to join 20-ft. sections of tubing. This is done in about 50 seconds with fast-acting solvent.



**2** Section of liner, 500 ft. long, is strung along ditch. Scraper with pulling line is under end of pipe to be lined.

**5** Successful pull completed as liner emerges from far end of this 500-ft. section.

**6** Tubing is cut off even with flange face and this flared adapter is cemented in place.

**NEW WEAPON AGAINST CORROSION**

# Plastic Liners for High-Pressure Pipelines

**by R. G. Deering**
**Assistant Pipeline Editor**

THIN-WALL plastic tubing for lining of pipe in high-pressure service is the latest weapon in the fight against internal corrosion. This butyrate tubing may be installed in welded or screw-coupled lines, in place or under construction and has operated successfully at pressures up to 980 psi. Installation is made in relatively short sections but use of special plastic adapters makes possible the protection of pipelines of any length.

Designed primarily for corrosion protection in water-flood projects, the plastic tubing may also be used in gas or oil lines where corrosion is a problem. It also holds promise for use with high-paraffin-content crudes, since the great majority of paraffins refuse to adhere to this type plastic.

**First big installation . . .** The first large-scale use of this lining was made recently on the Denoya lease of the Mid-Burbank Unit pool in Osage County, Oklahoma. Here, a 2,400-ft., 4-in. pipeline was completely lined with thin-walled plastic tubing. The welded, new-steel line will carry highly corrosive formation water in conjunction with the water-flood project of the unit. The

**3** Pulling device, smaller than pipe-diameter to traverse bends easily, is attached to wire line and tubing—ready for pull.

**4** Liner starts in as truck-mounted winch on other end makes pull. The liner is continuously lubricated as pull is made.

**7** Butyrate spacer is then cemented to flared adapter, forming flange gasket.

**8** Workman puts finishing touches on flange assembly—ready for next section.

installation was under supervision of Kewanee Oil Co., operator of the unit.

Initial operation of the line will be with pressure of about 60 psi. but changes in reservoir demands could require future pressures up to 300 psi.

Sections of six 2-in. lines, each about 300 ft. long, were also lined with the butyrate tubing. These sections, located at a highway crossing, have been severely damaged in the past by internal corrosion and cost of repair has been particularly high.

Attesting to the corrosive nature of the formation water, new steel pipe generally lasts about 1 year in the water-injection service, with leaks usually appearing within 6 months. Hydrogen sulfide gas and salt water are the corrosive agents to be dealt with.

The semirigid plastic tubing used in this installation is clear cellulose acetate butyrate and is manufactured by an extrusion process. Its wall thickness is .050 in. and the o.d. is .125 in. less than the i.d. of the pipe, the smaller o.d. being necessary to reduce friction during pulling operations.

In installing the tubing in the 4-in. line, the pipeline was divided into several sections, each about 500 ft. long and complete with welded-on, flat-face flanges. Sections were individually lined with plastic tubing and then all were joined with the flanges. Integrity of the plastic shield is maintained at each flange connection by use of special plastic adapters.

**Construction procedure . . .** The first step in the construction process is to make up a section of tubing slightly longer than the particular pipe section to be lined. The plastic joints, each 20 ft. long, are constructed with a short internal sleeve in one end. This sleeve, and the inside of the end of the succeeding joint, are brushed with a solvent, methyl ethyl ketone, and the two joints are pushed together. This is a rapidly drying solvent and a tight bond is effected in short order, the entire procedure requiring about 50 seconds. The completed connection is the same o.d. as the remainder of the plastic tubing. After a sufficiently long section of the plastic tubing has been cemented together, it is strung along the ditch ahead of the pipe to be lined.

Next, the steel line is thoroughly cleaned by use of conventional scrapers which are pushed through the line with air pressure. In this case only one scraper pass was necessary since the line was of new pipe, but in older lines a number of passes would be made until

all possible scale and corrosion product were removed. In any case, a light steel cable is attached to the scraper and pulled through the pipe on the last pass.

A pulling attachment is then connected to the end of the plastic section and to the wire line. This device, made of aluminum, consists of a tapered plug, a cup-shaped cylinder with an internal taper equal to that of the plug, and a threaded shaft to hold the two pieces together. The assembly is considerably smaller in diameter than the interior of the steel pipe, enabling it to traverse sharp bends and curves without binding or hanging.

The end of the plastic liner, after being notched to reduce its circumference, is fitted between the two pieces of the pulling assembly. The threaded shaft is then tightened to draw the plug into the cup, gripping the plastic tightly between the tapered surfaces.

Next, the tubing is aligned in front of the pipe section and the pulling operation is started: The tubing is continuously lubricated with oil during the pull, which is made with a light, truck-mounted power winch. Speed of the operation is indicated by the fact that one 620-ft. section was lined and flanged in a total time of 2½ hours.

**Flange connections . . .** One of the most important steps in the lining process is the preparation of flange connections at section ends. The plastic liner, having been stretched considerably during the pulling operation, is given time to "crawl" back into place and stabilize itself. It is then cut even with the flange face. A special sleeve, flared on one end, is cemented in place so the flared portion will fit snugly against the machined portion of the face.

The following section of line is finished in the same manner and the two flanges are aligned for making up. A butyrate spacer, which acts as a gasket, is then placed between the flanges and cemented to one of the flared sleeves. The completed connection is uniform in internal diameter and completely shields the pipe and flange metal from contact with internal fluids.

Final step in the lining process is to expand the plastic liner to the i.d. of the pipe. This is done with air pressure after all sections have been lined and flanged together.

For this step it is necessary to bleed all the air trapped between the liner and the pipe wall. Bleeder holes, ⅛-in. in diameter, are tapped through the pipe wall prior to pulling in the tubing. These holes are left open as the completed line is pressured to about 80 psi. and the air in the annulus is thus removed. The bleeders are then closed with pipe plugs and pressure released from the line, leaving the liner held tightly in place by vacuum action.

The resulting line is one which will easily withstand the system pressure and one which is also completely protected from internal corrosion.

**Other advantages . . .** Besides the protection against corrosion afforded by this plastic, it also has application in crude service where paraffin deposits are involved. The majority of paraffins have no affinity for the plastic used in this lining process and consequently considerable success has been had in its use for this purpose.

Also of considerable importance is the high C factor of the tubing—148 compared to 100 for concrete-lined pipe. This and the extremely thin wall of the tubing result in higher throughputs, lower friction losses.

In two previous test installations in Kansas this type lining was placed in 2-in. screw pipe and is successfully operating at pressures of 350 and 980 psi.

Engineering and construction of the Burbank installation was by Green Contracting & Engineering Co., Wichita, Kans. It is indicated by a member of this firm that in future work plastic tubing having slightly smaller o.d. will be used. This will permit pipeline sections of 2,500 to 3,000 ft. to be lined in one pull. The use of a union-type connection to take the place of flanges is also contemplated.

The butyrate liner used is called Tenite II; raw material for its manufacture is marketed by Eastman Chemical Products, Inc., of Kingsport, Tenn.

## Sizing Refinery Fractionating Equipment

*(Continued from page 119)*

cent of the vapor rate. The fractionation is correspondingly better, being sufficient for the usual separations between isobutane and normal butane.

**Superfractionator . . .** This is required to make those separations which are still more difficult, at a feed rate of only about 10 per cent of the vapor rate. This permits fractionation in the range of hexane and heptane, or a fair separation between adjacent olefins and paraffins. If the separation is too difficult, extractive distillation is sometimes an alternative; but, even then, with respect to size, the tower used would be about the same as a superfractionator. This completes the scale of rectification outlined in Table 7.

It is, of course, well known that reflux ratio and number of trays are to some degree interchangeable for effecting a given separation. Furthermore, if the key components are diluted in the feed with lighter and heavier components, the required reflux depends somewhat on the degree of the dilution; and, finally, the permissible degree of overlap of the key components in distillate and bottoms is a factor in determining both reflux ratio and number of trays required. Bearing these facts in mind, it should be possible to rely to a reasonable degree on the curves which have already been described for the various degrees of fractionation, recognizing them for what they are, viz., a rough classification only, and not a precise specification. There is still need for judgment and experience in the use of the curves and in assembling data of the type which is of more especial use in individual circumstances.

### Reference

1. Symposium on "Use of Wire-Mesh Sections in Asphalt-Entrainment Control in Vacuum Pipe Stills": I—J. S. Corlew, A. R. Orr, H. S. Fourer and D. H. Stormont, The Oil and Gas Journal, November 2, 1952, page 82; II—J. W. Russell, J. H. Fisher, L. R. Bunger and C. O. Anderson, The Oil and Gas Journal, November 23, 1953, page 94; III—G. H. Gaumer and H. J. Oberling The Oil and Gas Journal, December 28, 1953, page 70.

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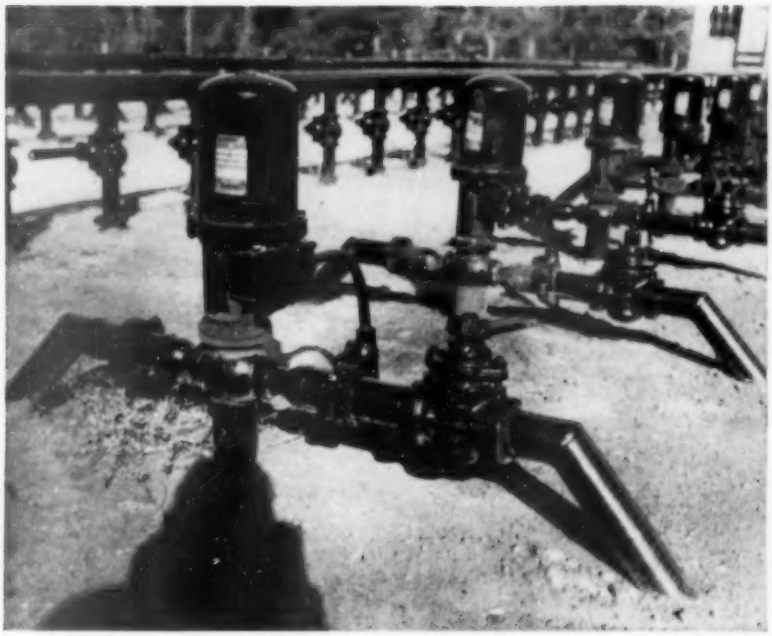
## Correction

E. H. Timmerman, of Shell Oil Co., Tulsa, and author of the article "Figure Your Chances Before Fracturing Your Well" *(The Oil and Gas Journal, June 7, 1954)* is area reservoir engineer. He is not, as erroneously reported, executive assistant to the vice president, that position being occupied by H. W. Penterman.



Electric-motor-operated valves in use to control flow on an East Texas line.

Time-clock-controlled switches at the well.

# Proper Well Control Improves Profits . . .

- *By insuring even drawdown of wells*
- *By improving stock-tank gravity*
- *By making pumper labor more efficient*

**by L. C. Spencer**

**PROPER well control means not only good insurance to the operator but significant gains in lease revenue from increased oil gravities and greater volume of oil produced. Investment of from 1 to 1½ per cent of well investment for equipment for efficient well control is a good yardstick for the prudent operator to follow.**

Longer flowing life (with the attendant lower operating costs under flowing conditions) coupled with protection of the reservoir, are important practical operating features resulting from proper well control. Erratic pressure drawdowns due to haphazard flowing schedules are minimized, reservoir decline is cushioned, and salt-water encroachment is not only delayed but fingering tendencies are reduced.

When a drilling operation is to start, most companies will approve an expenditure up into the millions of dollars to develop the property, but then after oil or gas is discovered in commercial quantities, they are reluctant to make expenditures over and above the bare cost of sufficient storage and flow lines to handle the production. They will then turn their investment over to a switcher or pumper and depend on him to get the production in the most efficient manner.

A tendency may exist for the switcher to flow flush wells to make up allowables from other wells on the same leases. This condition results in overproducing low-gas-oil ratio wells while oil wells with higher ratios remain closed in. This method of operation usually results in premature reduction in bottom-hole pressure of the wells which are being overproduced. Also it leads to premature encroachment of salt water thus requiring earlier installation of artificial-lift equipment. These conditions would have been reduced had the wells been properly controlled from the date of original completion.

Controls are varied and of many designs. Among these are mechanical-clock controls, electric-clock controls, and more recently, electronic controls. Therefore, it is well to consider selection of production equipment for efficient operation.

**Separation . . .** Sufficient separator capacity should be available on the lease to handle the daily allowable with addition of at least one test separator. This enables the testing of any well at any given time without closing in other oil wells while test is being conducted. Separators should be equipped with back-pressure valves and pilot-operated dump valves.

**Headers . . .** Each battery should be equipped with header so arranged that each well can be flowed at any time through either the production separator or the test separator by simply closing one valve and opening another.

**Flow lines . . .** A separate flow line should be installed on each well. This line should be tested to withstand the maximum tubing pressure under which the well may operate. Flow lines should remain on top of the ground where possible. Not only does aboveground position permit regular visual inspection, but heat from the rays of the sun tends to reduce paraffin accumulation in flow lines, even on cold winter days.

**Well controls . . .** Each well should be equipped with a choke for positive

control of flow from the formation. Obviously, each well presents a different problem. Therefore, it will be necessary to test each well to find the proper choke size which will produce the allowable within a given time with a gas-oil ratio within the prescribed field rule limit. These chokes should be set so that not more than the allowable is withdrawn from any individual well during a single producing day.

Various time-controlled intermitting valves, including both mechanical and electrical-clock controls, facilitate efficient lease operation. These controls permit versatile operation in that wells can be flowed for any length of time during the day by a simple adjustment of the time-cycle element.

Wells can be flowed from a few seconds up to 24 hours per day. Flow schedules are dependent upon well conditions and the length of time required to obtain the specified allowable. In many cases, it has been found that wells can produce their allowables by flowing them for as short a period as 1 minute out of each 10-minute period of this day; this technique maintains tubing and bottom-hole pressures at highest possible levels.

In addition, it has been observed that flowing life of many wells has been extended significantly in this manner, where, otherwise, artificial lift would have been required. Economics accruing from installation and operation of proper well controls can readily be understood from this condition alone.

### Lease Histories Compared

Consider two lease histories and the results obtained both in operating efficiency and increased revenue.

**Original conditions . . .** In 1948 these leases were produced manually; the switcher opened the wells and flowed them until he had produced the lease allowable. Theoretically, he opened each well until it had produced its particular daily allowable and then closed it in. Actually, it has been observed that the switcher opened only some of the wells on a large choke to produce the allowable for all of the wells on the lease. As a result, many of the wells were pulled too hard with a greater drop in bottom-hole pressure than otherwise would have been necessary. Salt-water production increased at too fast a rate, as the result.

**Later conditions . . .** At this time four switchers were required; three regular and one relief man worked around the clock to produce the lease allowable. Gas-oil ratios became excessive with resultant penalties in allowables. Thus 7 out of 18 wells on Lease "A" were making water. On Lease "B," 2 out of 25 wells were producing salt water. On each of these leases, there were four and five wells on each flow line making it impractical to test these wells as often as was required.

### THE AUTHOR

**L. C. Spencer is an official with Indian Royalty Co., at Denver City, Tex. He was formerly with the petroleum - engineering department of Wilson Supply Co. for 7 years and served as Permian basin manager for the firm. Since 1952 he has held his present position where he is in direct contact with principal operating oil companies in the Permian basin on production problems.**

### Well Controls Installed

First, clock-controlled intermitting valves were installed on Lease "A." Each well was tested and set on an allowable flowing schedule—to flow from 1 to 2 minutes out of each 15 to 20-minute period.

**Results obtained . . .** As a result, within a few months, produced gas-oil ratios were observed to fall within the 2,000 cu. ft. per bbl. limit. This enabled the state regulatory commission to remove penalties imposed for exceeding gas-oil-ratio limit; thus allowables restored amount to from 2 to 18 bbl. per day per well. This allowable improvement alone soon paid for the equipment. Bottom-hole pressures soon stabilized, and increased in some cases; in all cases, the rate of bottom-hole pressure decline was retarded. Water production dropped in all wells; at present only two of the seven oil wells originally producing water require treating.

Since this reservoir operates under a solution-gas drive, eventually some of the wells again reached a point where produced gas-oil ratios exceeded field rule limit. Individual flow lines were then laid from each well, and intermitters were moved from the well head to the header at the separator with full well pressure being carried on these flow lines. It was then found that, in nearly every case, gas-oil ratios were lowered by 30 per cent due to the shorter flowing time through the meter. Drawdown now amounted to seconds where it had been minutes since the flow line was now only a few feet between intermitter and separator. Formerly this distance ranged up to 1 mile in places. Gravity increase result from this installation brought revenue gains of from 2 to 4 cents per barrel.

Operational history of Lease "B" is similar to Lease "A." On Lease "B" two of the wells which made water originally now require no treating. In addition, increases were noted in the produced gravity.

**Conservation of gravity . . .** This is one factor which not enough lease operators take into consideration. This condition prevails even though the fact that pipeline companies base their price of crude on gravity should cause them to realize its importance.

Tight storage tanks are a necessity. All hatch gaskets should be kept in good repair and should be kept clean to prevent the escape of heavy ends. Vent valves should be installed on the tanks.

Back pressure on storage to hold these vapors in place should be held at 3 oz. Back-pressure valves should be installed on all separators so that a maximum of pressure can be maintained, thus preventing the flow of the vapors from the mist extractor into the vent line, or to the gasoline plant. Also, pilot-operated dump valves are a controlling factor since they put the oil into storage all in one movement instead of the gradual "squeezing" out observed with the older type float-operated valves.

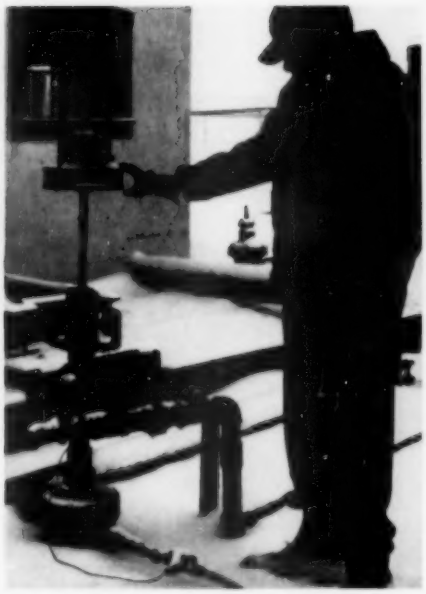
Well-head pressures should be carried on the flow lines up to the separators and then choked at this point. In this way, the heavier vapors are retained in the oil instead of going off into the gas line. Very little of the lighter hydrocarbons are lost in the short distance from the choke at the header to the separator and immediately into the stock tanks.

**Temperature effects . . .** Another point in favor of choking the well at the header is the delivery of the oil in storage at a much lower temperature than if choked at the well head. Refrigeration takes place through the choke due to pressure drop and the oil enters the storage before it has had time to warm up again. This factor is also an aid to retaining the oil in its original solution and thereby at the highest possible gravity. It has been proved that an operator can lose from 3 to 4 cents per barrel on his crude due to loss in gravity by failing to properly equip the lease to conserve it.

The following are actual figures on gravity on the two leases mentioned earlier in this article.

**Lease "A."** Before gravity conservation measures were taken, a 5 months'

*(Continued on page 127)*



At left is a typical formation heater for use at Cut Bank, while at right is a Carter well fitted with a bottom-hole heater. Though these photos were taken last winter, heaters are used throughout the year.

# Electric Formation Heaters Boost Cut Bank Production

## ...but engineers are not sure why

**by H. E. Allen and R. K. Davis**

**THE ever-present problem of increasing production in oil wells nearing depletion has prompted various types of remedial work in Cut Bank field of Glacier and Toole counties, Montana. Attractive results have been obtained by the use of subsurface electric heaters. This article reviews design features, installation procedures, and performance of electric heaters used in 28 wells operated by Carter Oil Co.**

**The first heater application in the field was made by another company in 1950 and several operators are now using the methods to obtain appreciable production increases.**

Exact function of formation heaters in Cut Bank sand wells is not known although it is suspected that the application of heat removes paraffinic residue from the sand face and reduces reservoir-fluid viscosity in the immediate vicinity of the well bore. During the early producing life, wells experienced severe paraffin accumulation in tubing and flow lines. This operating difficulty has subsided with reduced productive capacity.

Subsurface measurements have indicated the normal temperature of 80° F. to be increased to about 180° F. in the immediate vicinity of a formation heater. Criteria for selection of wells to be subjected to heating are not established because of brief operating history and limited number of applications. No obvious reasons for success or failure are now apparent.

At January 1, 1954, electric formation heaters had been installed in 28 Carter-operated Cut Bank sand wells. Two installations were completed but had not experienced initial reaction, two had been removed because of caving conditions, and two for lack of response. The two wells without initial reactions are being considered for replacement since delayed reactions have been noted since heaters were removed.

A summary of benefits is provided in Table 1. Total production gain has been 47,769 bbl., of which 2,539 bbl. is attributed to cleanout procedures. Initial production increases as great as 23.5 bbl. per day have been experienced with average gain for 26 wells from 8.5 to 15.7 bbl. per day. Accumulated increases shown by the tabulation represent only preliminary benefits since 21 of the heaters now in operation were installed in 1953 and have recorded only brief service. Operating time for the entire group averages 6.7 months per well.

Fig. 1 is a composite production performance curve for wells in the program. The departure of actual production from normal decline extrapolation is notable. In December 1953, production gain is shown as 179 bbl. per day

Typical well performance is portrayed by Fig. 2. Formation heater was installed in this well in December 1951 for initial production increase from 7.4 to 19.2 gross barrels per day. Total gain at end of 1953 was 7,148 bbl.

**How field developed . . .** Cut Bank field, located in North Central Montana on the west flank of the Sweet-

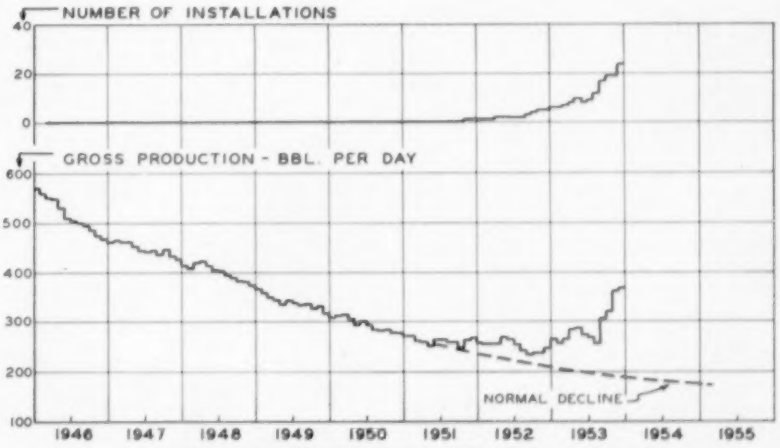



Fig. 1—Production performance of formation-heater installations.

Authors are with Carter Oil Co., Billings and Cut Bank, Mont., respectively. Paper presented at A.P.I. Rocky Mountain district meeting, Casper, Wyo.

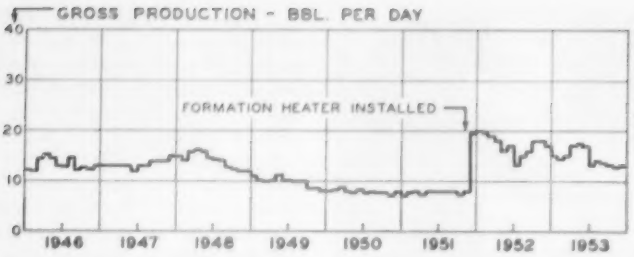



**Fig. 2—Production on Well No. 1 spurted after a formation heater was installed.**

grass arch, was discovered in 1926. Originally considered a Lower Cretaceous gas field exploitation resulted in oil discovery and an ensuing development program resulted in defining a productive area of about 39,000 acres by drilling more than 1,200 wells.

Various Lower Cretaceous sands produce in the field with the Cut Bank sand, at average depth of 2,800 ft., being the principal zone. Accumulated production from the field has been over 70,000,000 bbl. with solution-gas-drive recovery mechanism predominant. In 1953, total production from 1,100 wells was about 2,500,000 bbl., an average of 6 bbl. per day per well.

Development of a suitable electric formation heater came about through a program of field experimentation. Fig. 3 reviews construction details of the assembly now in use. It consists of a combination of commercially available components into an assembly suited for service under prevailing well conditions. An immersion-type 230-volt, 5-kw. heater element is installed in a case of 4-in. line pipe, perforated to permit complete submergence of the element.

Terminal head of the heater, which must be completely isolated from well fluids, is enclosed in an assembly of conventional pipe fittings with one terminal grounded to the case and the other connected to a lead wire, conducted from the heater case by a ½-in. pipe and stuffing-box arrangement. For additional protection of the heater terminals, the space in the head is filled with a thermoplastic resin.

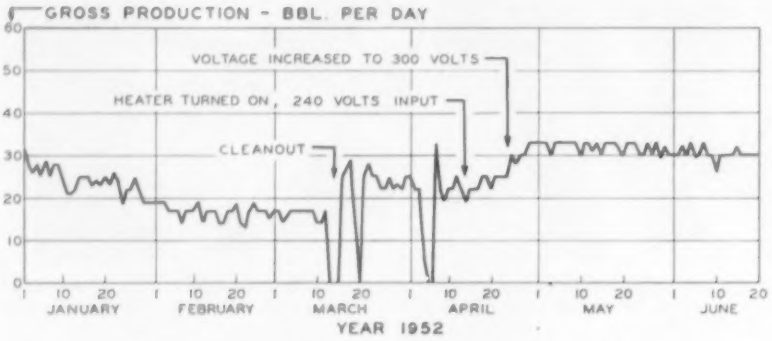



**Fig. 5—Formation heater and cleanout reaction, Well No. 2.**

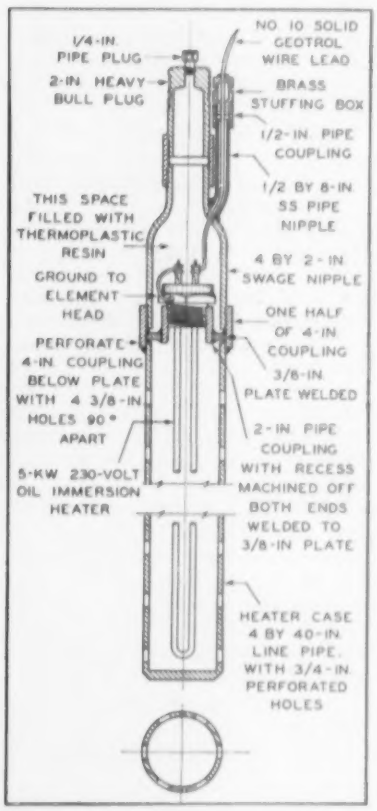

1/4-IN. PIPE PLUG
2-IN. HEAVY BULL PLUG
NO. 10 SOLID GEOTROL WIRE LEAD
BRASS STUFFING BOX
1/2-IN. PIPE COUPLING
1/2 BY 8-IN. SS PIPE NIPPLE
THIS SPACE FILLED WITH THERMOPLASTIC RESIN
GROUND TO ELEMENT HEAD
4 BY 2-IN. SWAGE NIPPLE
ONE HALF OF 4-IN. COUPLING
PERFORATE 4-IN. COUPLING BELOW PLATE WITH 4 3/8-IN. HOLES 90° APART
3/8-IN. PLATE WELDED
2-IN. PIPE COUPLING WITH RECESS MACHINED OFF BOTH ENDS WELDED TO 3/8-IN. PLATE
5-KW 230-VOLT OIL IMMERSION HEATER
HEATER CASE 4 BY 40-IN. LINE PIPE, WITH 3/4-IN. PERFORATED HOLES

**Fig. 3—Diagram of an electric formation heater.**

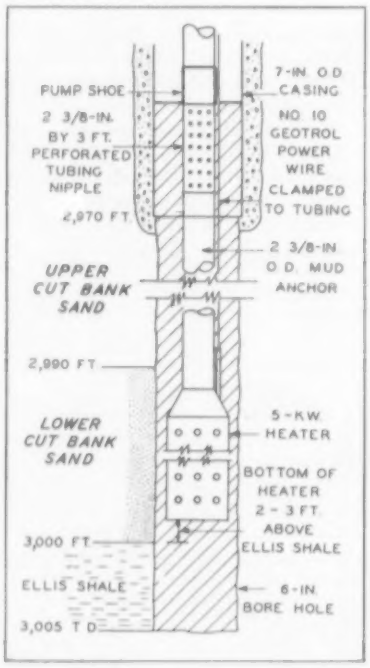



**Fig. 4—A typical installation for an electric formation heater.**

The formation heater is installed on tubing below the mud anchor customarily used in Cut Bank sand wells. Installation arrangement is shown in Fig. 4. Experience has indicated that placement of the heater with respect to the producing horizon is critical. Since virtually all wells were completed without electric logs, customary practice, after brief cleanout, is to run a radioactivity log to define the producing zone and provide basis for accurate measurements.

The heater is located opposite the best developed pay section with its base above the underlying shale interval. This location insures complete immersion in well fluid and maximum utilization of heat while protecting the assembly against plugging by cavings.

No. 10, 600-volt, solid copper conductor with hydrocarbon-resistant sheath, is used to connect the heater to surface electrical energy source. This wire, purchased in 3,000-ft. lengths, is secured to tubing by hose clamps and is protected from clamp and tubing by tank gasket material. Since the insulation is not highly abrasion resistant, centralizers are placed on every other tubing collar. Current practice is to weld three ¼ by 1½ by 2-in. long spacers on the collar. If evidence of hole deviation is available, such as that indicated by tubing-collar wear or wire failure at a particular depth, closer centralizer spacing is used.

At the surface, the wire is conducted out of the tubing-casing annulus through a tubing-head side outlet and stuffing-box assembly. Electrical circuit is completed by connecting a ground wire to tubing through this stuffing box, thereby making the tubing the conductor for the ground circuit.

Surface equipment includes conventional conduit, circuit breaker, and other equipment necessary for use of purchased power.

Installation costs vary over a considerable range because of individual well-cleanout requirements. Average cost for the 28 wells thus far equipped has been about $2,300. Usual operating practice, following heater installation, is to produce the well for sufficient time to establish rate and define cleanout benefits before the heater is activated. Typical well performance is portrayed by Fig. 5. Initial increase at this well was from 15.2 to 33.0 bbl. per day with accumulated increase to January 1, 1954, of 10,991 bbl., 1,323 due to cleanout and 9,668 bbl. attributed to heating. Reaction is usually obtained soon after heat application although in two wells maximum benefits were obtained after 7 and 10 months.

# Proper Well Control Improves Profits

*(Continued from page 124)*

average of revenue was analyzed on Lease "A." The allowable for this period was 123,900 bbl. produced and run at an average price of $2.38 per barrel. The corresponding 5 months of the next year were then checked. A total of 118,713 bbl. was produced and run for an average price of $2.41 per barrel, an increase of 3 cents per barrel. At this rate the revenue increased $8,920 for the year using the same allowable.

**Lease "B."** Revenue from Lease "B" followed on the same curve as Lease "A" and an increase of 3 cents per barrel on oil produced was realized.

### Increased Oil Volumes

Another point of interest is the increase in volume of oil produced due to conservation of gravity. On an average, every degree increase in gravity results in a saving of 2½ per cent in volume based on $2.00 oil. Therefore, on a lease having 1,000 bbl. per day allowable and gravity-saving equipment results in a 1°-increase in gravity, the yearly increase in revenue will exceed $30,000.

In most cases where leases are properly equipped the gravity increase amounts to more than 1°. This increase in volume means also that allowables can be produced with less withdrawals from the reservoir, which results in a longer life from producing formations. On the above-mentioned allowable of 1,000 bbl. per day there would be realized 25 bbl. per day saving in volume produced due to 1° increase in gravity; over a period of 1 year this would amount to 9,125 bbl.

**TABLE 1—ELECTRIC FORMATION HEATERS STATUS AT JANUARY 1, 1954**

| Wells— | Heater service months | Daily average production gross bbl. oil | | Accumulated production increase gross bbl. oil |
|---|---|---|---|---|
| | | Before | After | |
| 1 | 25 | 7.4 | 19.2 | 7,148 |
| 2 | 21 | 15.2 | 33.0 | 10,991 |
| 3 | 15 | 22.8 | 27.0 | 3,803 |
| 4 | 14 | 8.6 | 15.3 | 2,711 |
| 5 | 12 | 3.0 | 11.6 | 3,246 |
| 6 | *10 | 12.0 | 12.0 | 2,279 |
| 7 | 9 | 5.3 | 18.0 | 3,192 |
| 8 | 8 | 9.8 | 16.8 | 2,010 |
| 9 | 8 | 7.0 | 13.2 | 739 |
| 10 | 6 | 5.8 | 15.8 | 2,197 |
| 11 | 5 | 9.2 | 19.3 | 1,669 |
| 12 | 5 | 9.8 | 16.4 | 1,096 |
| 13 | 5 | 21.0 | 26.8 | 756 |
| 14 | 4 | 10.8 | 20.3 | 917 |
| 15 | 4 | 15.4 | 19.2 | 650 |
| 16 | 4 | 1.4 | 3.7 | 366 |
| 17 | 4 | 6.4 | 6.7 | 33 |
| 18 | 4 | 2.1 | 16.3 | 1,503 |
| 19 | 3 | 9.2 | 32.7 | 1,319 |
| 20 | 3 | 2.9 | 9.4 | 470 |
| 21 | 1 | 3.0 | 7.5 | 124 |
| 22 | 1 | 5.0 | 12.0 | 238 |
| 23 | 1 | 2.5 | 9.2 | 100 |
| 24 | 1 | 3.2 | 5.6 | 212 |
| 25 | †1 | 14.0 | 14.0 | |
| 26 | †1 | 7.2 | 7.2 | |
| 27 | (‡) | 3.5 | | |
| 28 | (‡) | 1.0 | | |
| Total | 175 | | | 47,769 |

*Heater removed after 10 months' service with no reaction. Delayed reaction has since been experienced. †Heater removed because of severe caving. ‡Heater installed in December 1953.

# BOOKS

1953 SUPPLEMENT TO THE BOOK OF A.S.T.M. STANDARDS, INCLUDING TENTATIVES. Part 5. Published by the American Society for Testing Materials, 1916 Race Street, Philadelphia 3. 332 pp.

This supplement, Part 5, to the 1952 A.S.T.M. Book of Standards, covers accepted tests and tentatives for fuels, petroleum, aromatic hydrocarbons, and engine antifreezes. Eleven of the twelve standards presented in this supplement are replacements of previous standards, and one represents a standard revised and adopted in 1953. Similarly, of the 34 tentatives, 17 are replacements of existing tentatives, one represents a standard that has been revised and reverted to tentative, while 16 are published for the first time.

THE SULPHUR DATA BOOK. Compiled by the technical staff of Freeport Sulphur Co., and edited by William N. Tuller. Published by the McGraw-Hill Book Co., 330 West Forty-second Street, New York 36. 143 pp., $5.

Engineers, chemists, and students who work with sulfur will find this a helpful reference work because it brings together many important data on sulfur that previously were scattered throughout technical literature.

Principal topics presented are the nature of sulfur, its physical and chemical properties, its reaction thermodynamics, its solubility in various substances, and methods of analyzing it. Amply illustrated with tables and charts, the book includes sulfuric acid conversion tables and a detailed bibliography of pertinent literature. Capably designed and printed in two colors, it is easy to read and well organized.

METALS AND HOW TO WELD THEM. By T. B. Jefferson and Gorham Woods. Published by James F. Lincoln Arc Welding Foundation, Cleveland 17. 319 pp., $2.

Designed as a text book for classroom or home study, this book presents a simplified explanation of metallurgy and the various welding processes. Most of the book's 20 chapters are devoted to different metals and their characteristics in order to supply the basic information about metals necessary to proper welding techniques. The last few chapters take up the specifics of making good weld in all types of metals.

The entire work is a project of the James F. Lincoln Welding Foundation, a nonprofit educational foundation established to stimulate scientific interest in arc welding.

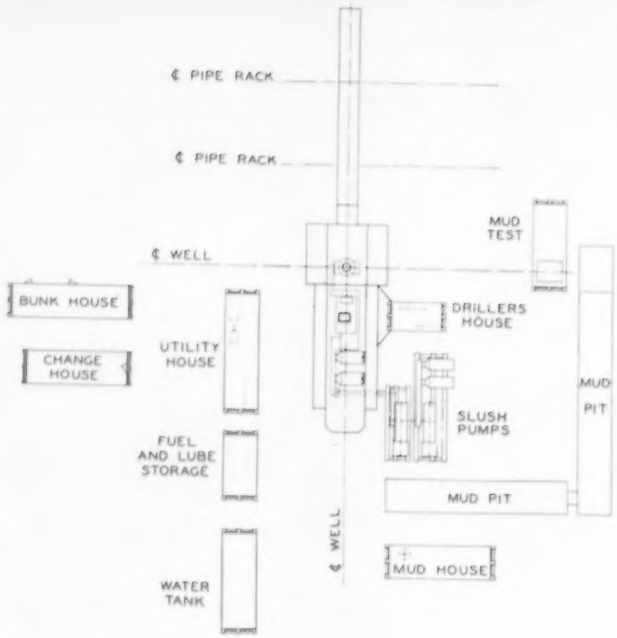
Draw works trailer permits engines, compound, and draw works to remain intact for highway moves. At right, Fig. 1 is the general equipment layout of the mobile rig on location.

## Shell's New Rig Features

# MOBILITY AND FLEXIBILITY

## . . . for Gulf Coast Drilling

**by R. A. Tappmeyer**
**and R. L. Walker**




SHELL OIL CO. now has in operation on the Gulf Coast a medium-depth-capacity drilling rig that is specifically designed for maximum mobility without sacrificing performance.

The rig is also suitable for deep workover operations, and the major rig components, excepting the mud pumps, were unitized on two trailers comprising permissible highway loads. A schematic layout of the rig with all component packages is illustrated as Fig. 1.

The draw-works trailer, pictured, contains a double-drum draw works with a three-speed transmission, driven through a roller-chain compound by two diesel engines. The engines are equipped with torque converters.

Approximately 400 hp. can be delivered at the output shaft of the engine torque converters for hoisting service. The engine compound also includes a roller-chain pump drive which extends below the floor level of the trailer to a power takeoff. This trailer, with the above equipment mounted, makes one permit load for highway moves.

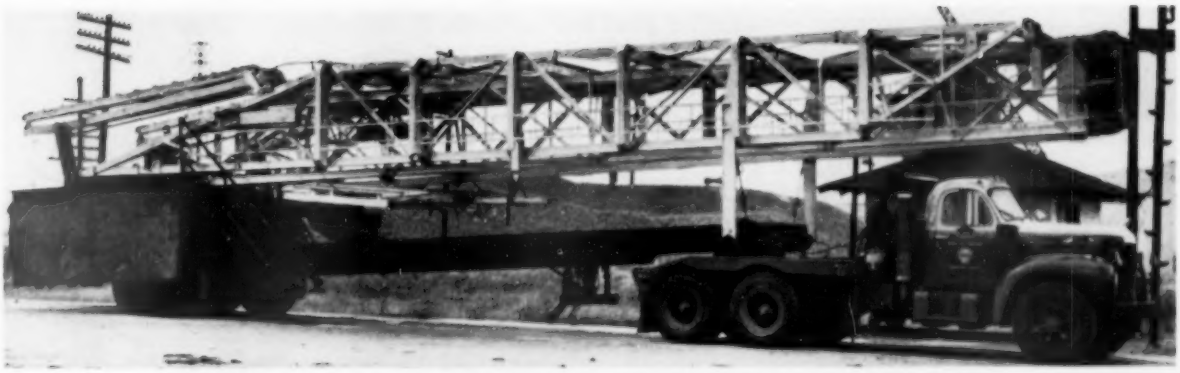
A second trailer contains a telescoping, 97-ft. mast having a 350,000-lb. A.P.I. rating, an integrally mounted 7½-ft. substructure, 17½-in. rotary table, ramp, and pipe-rack catwalk which serves as the trailer gooseneck when attached to a tractor for moving. This complete unit also comprises one permit load for highway moves.

Application of the 97-ft. mast permits mouse-hole connections and racking drill pipe in doubles, with weight and dimensions such that the mast-substructure trailer remains a complete unit as a permissible highway load. The advantage of mobility plus quick rigging up and rigging down with this unit is felt to be of greater importance than a mast capable of racking thribbles for medium-depth Gulf Coast drilling, due to the relatively few trips normally required.

The doubles mast has not penalized round-trip time to any great extent as a complete trip from 7,000 ft. with drill pipe and four stands of drill collars was recently timed at 4 hours, 8 minutes, exclusive of the time the bit was out of the hole.

In rigging up, the draw-works and mast-substructure trailers are spotted back to back and joined with tapered drive pins (see Fig. 1). Screw jacks permanently pinned to the frames of the trailers swing into operating position for leveling the two units and to take weight off the trailer wheels. The rotary table mounted on the mast-substructure trailer is driven from the draw-works trailer through a swinging type, oil bath, chain drive, eliminating any necessity for breaking chains between the two units when moving. Hinged wings at floor level of the substructure provide a working area over 19 ft. wide and 10½ ft. from the center of the rotary table to the pump ramp. These wings fold down to permit high-

Authors are drilling engineers with Shell Oil Co., in the Houston and Denver areas, respectively.



**By using this mast-substructure trailer, the complete substructure is allowed to remain as a portion of the unit in moving. Hinged wings, folded for moving, provide a floor working space more than 19 ft. wide.**

way moves without dismantling any portion of the substructure excepting the handrails.

In moving, the drilling line is removed from the draw-works drum after the mast is lowered, and the blocks are left strung up with the drilling-line spool set forward on the catwalk over the rear tractor axles. For field moves the blowout preventers are hung in a sling from a dolly mounted in the substructure under the derrick floor and can be rolled out of the way for well completion.

**Within highway limits . . .** For highway moves the major rig components, including the draw works, draw-works engines, mast, substructure, blocks and drilling line, and the two skid-mounted mud pumps, one independently powered and complete with engines, are compacted into four trailer loads. Three of these loads require permits, but all are within the maximum axle load and dimensional limits as imposed by the Texas State Highway Department. The remainder of the rig, including all auxiliary and accessary equipment, exclusive of drill pipe, comprises 10 additional loads.

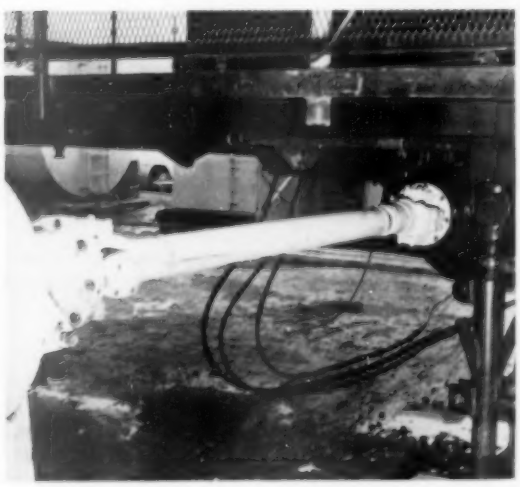
The initial highway move with the new rig, involving a distance of approximately 200 miles, was completed in 28 working hours, including 8 hours on the road. Probably more significant is the time required in making location-to-location field moves as the crews become more familiar with the rig. Recent field moves, of ¼ to ½ mile, have averaged 10 hours from release of the rig on one well to spudding of the next; and one recent move was completed in 8½ hours.

**Pumps for jet drilling . . .** The hydraulic system was designed to take maximum advantage of the equipment utilized in application to jet bit drilling. This system includes two separately skid-mounted 300-hp. slush pumps equipped with pulsation dampeners. One pump is driven from the rig-compound power takeoff through a universal-jointed torque tube, connected to a speed-reducing chain drive mounted on the pump skid. The second pump is independently powered by two diesel engines through a chain drive with the engines, drive, and pump mounted as a single skid unit. These engines are governed to develop 250 hp. each and are equipped with torque converters.

The power train from the engines to both pumps was designed with one of the specific purposes being to reduce shock loads created by pressure pulsations as a result of the variable rate of fluid delivery inherent with duplex pumps. For this purpose, torque converters were selected to provide a smooth application of power to the pumps and maximum flexibility of pump operation. The torque tube shaft and chain drive inherently supplies a much smaller flywheel effect than that encountered with the large pump sheave in V-belt drives.

The two pumps are joined together at two points on the skids with drive pins and a tie bar between the pump frames, as illustrated in an accompanying drawing, to facilitate coupling of

*(Continued on page 132)*



**Torque-tube slush-pump drive from main compound.**

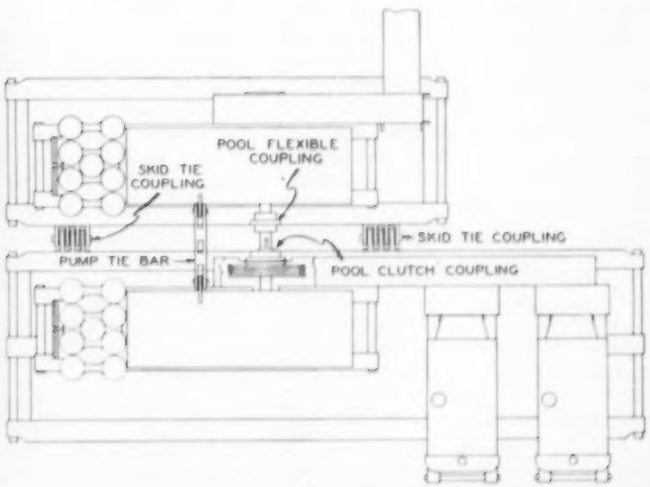



**Fig. 2—This connection of pinion shafts of two pumps for phase-controlled parallel operation reduces discharge pressure pulsations.**

Is it economical to install a pipeline with the BEST coating money can buy? "No!" says Sharpe of Humble Pipe Line Co.—and presents data which indicate that optimum costs are attained with a reasonably well-coated line which can be cathodically protected with moderate current quantities.

HERE'S THE JACKPOT QUESTION

# How Good Must Pipeline Coating Be?

by L. G. Sharpe

AN examination of the cost relationships among various coating practices and cathodic-protection requirements of each indicates that the expense of cathodic protection on reasonably well-coated lines is so small that efforts to secure more than a "good" coating are difficult to justify.

A coating consisting of 3/32-in. pipeline enamel wrapped with felt and supplemented with cathodic protection appears to be the best balanced combination for pipeline protection. The costs of such additional items as complete holiday detection, coating reinforcements, ditch padding, and shielding material are so high that the interest alone will be many times the amount saved on cathodic-protection investment.

**Coating trends . . .** During the early thirties, when cathodic protection was merely a curiosity, prevention of pipeline corrosion was to be obtained only through coatings. It is understandable then that during the thirties and on into the forties, strong efforts were made to develop and apply holiday-free coatings.

It is now generally recognized that even with careful application and rigorous inspection it is difficult and expensive, if not impossible, to obtain or maintain a holiday-free coating. However, with cathodic protection having been developed, demonstrated, and accepted, it is no longer necessary to rely as heavily on coatings for corrosion control. Electrical protection has proved effective on bare pipe, on poorly coated pipe, and on well-coated pipe.

Nevertheless, in recent years, there seems to be a trend toward coating practices which attempt to achieve holiday-free, perfect coatings. A number of recent pipeline-construction contracts have required that completed lines be traversed with a Pearson holiday locator and all holidays repaired by the contractors. A specification with similar intent requires the contractor to produce a coating job of a specified minimum electrical resistance.

A proposed A.P.I. pipeline construction code is in preparation at the present time. Among other things, the committee was faced with the problem of whether or not to include, as requirements of good practice, the use of rock shield in rocky areas, or the hauling of sufficient fine dirt, or sand, for padding below and above the pipe to protect the coatings.

Both practices can be expected to improve quality of coatings; they most certainly add considerably to construction costs. Are these practices and the costs they involve justified? What is the optimum combination of coating and cathodic protection?

**How good must coating be? . . .** The first question that needs to be answered is how good is a "good" coating job? To answer this question, in 1948, we made a thorough examination of the best coated line we had in the ground: our 8-in. Baytown-Irving products line, laid 2 years earlier.

The southern 127 miles between Baytown and Hearne was yard coated with coal-tar enamel reinforced with glass mat and wrapped with felt. All coated

Author is a corrosion engineer with Humble Pipe Line Co., Houston. Portion of paper presented at the 1954 annual meeting of the National Association of Corrosion Engineers held in Kansas City.

**COMPARISON OF COATING PRACTICES AND COSTS WITH CATHODIC PROTECTION CURRENT AND COSTS**

| Size | Line | Length (miles) | Coating, description and total cost, $/mile—Remarks | Cathodic protection: Current drained (amp./mile)* | Cathodic protection: $/mile/year: Installation cost | Cathodic protection: $/mile/year: Total operating expense |
|---|---|---|---|---|---|---|
| 8-in. | Butane-propane, Satsuma - Hearne | 88 | Coal-tar enamel and felt; over ditch reconditioning; 1946—Recifiers installed 1952 | 0.088 | †10 | 2-5 |
| 8-in. | Products line, Baytown-Hearne | 127 | Coal-tar enamel, glass and felt; yard applied; 1946; rigorous inspection; total cost $1,510/mile—Rectifiers installed 1952 | 0.034 | †10 | 1-2 |
| 8-in. | Products line, Hearne-Irving | 148 | Asphalt enamel, glass and felt; over ditch; 1946; total cost $1,630/mile—Magnesium anodes installed 1948; shorted casings took about 50 per cent of current | 0.05 in 1948 | ‡29 | 16 |
| 8-in. | Products line, Hearne-Irving | 148 | Asphalt enamel, glass and felt; over ditch; 1946; total cost $1,630/mile—Rectifier installed 1952; protecting 34 miles | 1.2 | 49 | 8.70 |
| 18-in. | Kemper-Satsuma, western portion | 178 | Coal-tar enamel and felt; over ditch; 1950; not jeeped; no glass; no rock shield or ditch padding; coating cost $2,171/mile—Rectifiers installed 1952 | 0.09 | ¶37 | ¶4.80 |
| 18-in. | Kemper-Satsuma, eastern portion | 193 | Coal-tar enamel, glass and felt; yard applied; 1950; jeeped; coating cost $3,270/mile—Rectifiers installed 1952 | 0.14 | §47 | §7.33 |
| 10-in. | Skidmore-Ingleside | 65 | 9 miles coated with coal-tar enamel and felt; applied 1948; balance Safemco and felt, 1927—Rectifiers installed 1951 in lieu of complete reconditioning | 40 | 1,000 | 197 |

*Full protection, minimum pipe-to-soil potential, 0.85 volt current to line only; excludes stations, shorted casings. †Costs difficult to prorate. Parallel lines take most of rectifier output. ‡Includes shorted casings. §Includes 70 per cent of current taken by Warda station. ¶Includes 65 per cent of current taken by Eckert station.

pipe was tested with a holiday detector at the coating yard and again over the ditch before lowering in. Inspection was rigorous.

The northern 148 miles from Hearne to Irving was coated with asphalt enamel reinforced with glass mat and wrapped with felt. The coating was applied over the ditch and line-traveling equipment. In some sections the coated pipe was cradled directly in the ditch behind the coating machine; in others the coated pipe was lowered onto padded skids. An effort was made to secure a smooth, soft ditch bottom throughout and in rocky areas the ditch was padded with sand. This section also was carefully inspected.

Sections of the line, each 5,000 ft. in length, were traversed with a Pearson holiday detector. The holidays were staked and more than one-half of them were uncovered and inspected. This inspection, covering 10 per cent of the total line length, was uniformly distributed along the right-of-way.

In the southern portion, a total of 62 holidays were located, an arithmetic average of 5 holidays per mile of inspected line. If the average is valid for the entire 127 miles, a total of 635 holidays exist in the coating between Baytown and Hearne.

Major causes of holidays were mechanical damage incurred during construction and faulty application of field joint coatings. Mechanical construction damage caused about 50 per cent of the holidays inspected and included tool cuts, unrepaired skid damage, bulldozer-blade gouges, scrap metal penetrating the coating, etc. Faulty field-joint coating accounted for about 40 per cent of the holidays inspected. Only two holidays chargeable to yard coating misapplication were found.

No evidence of soil-stress penetration or other deterioration of the coating was observed even though the line had been in service 2 years and much of the right-of-way was through tight-clay soils.

In the northern portion, a total of 52 holidays were located, or about 3.5 holidays per mile. However, inspection of the coating revealed it to be generally penetrated by soil clods. These penetrations appeared to be a combined result of lowering hot coating directly into the ditch and the soil stress deformation during 2 years of underground service. On an average, 1 to 10 penetrations per foot of pipe were found wherever the coating was inspected. Because of the many uniformly distributed penetrations the traverse located only major holidays. The number 3.5 holidays per mile is, therefore, meaningless. Inspection of the holidays disclosed them to be primarily construction damage similar to that found in the southern portion.

**Protection costs . . .** The northern part of the 8-in. products line just described offers a good example of costs incurred in protecting lines with "poor" coatings. The northern 148 miles of this line was protected in 1948 with 22 groups of magnesium anodes. Eleven shorted casings totaling 1,984 ft. of bare 12-in. pipe consumed more than one-half of the output of the anodes.

Despite the shorted casings and the condition of the coating, the costs of installing protection were only $4,300, equivalent to only $29 per mile of protected pipe for an expected 10 years. However, in the succeeding 5 years current requirements have increased somewhat, output of some anode groups has decreased, and additional casings have become shorted.

In one area, 11 additional groups of anodes were installed in 1953 at a total cost of $1,760. In another area, a rectifier was recently installed which is protecting 34 miles of pipe. Initial rectifier installation cost was $1,670, or $49 per mile; total annual operating expense is $8.70 per mile of protected pipe per year.

The southern portion was protected along with several other lines in the same right-of-way. Costs are difficult to prorate but about $10 per mile installation cost and $2 per mile per year total operating expense are liberal estimates.

These data indicate that, from a dollars-and-cents standpoint, the coating imperfections are not significant. Supplementary cathodic protection to compensate for the imperfections costs but a fraction of just the cost of inspection.

### Cost Analysis

In the table is a summary of pertinent information on a number of pipelines for comparing coating practices and costs with cathodic protection requirements and costs.

The 8-in. butane-propane line, coated

**"Cost of installing cathodic protection amounted to $37 per mile. Total operating expense of the protection amounts to only $4.80 per mile per year. . ."**

over the ditch during reconditioning in 1946, is fully protected with about the same amount of current as the 8-in. products line which parallels it in the same right-of-way between Satsuma and Hearne. Neither the addition of glass reinforcement to the products-line coating nor the other efforts expended to lay it holiday-free give it significant performance advantage over coating on the butane-propane line. These "extras" cost at least $200 per mile.

The Kemper-Satsuma 18-in. provides a basis for evaluating the probable worth of 100 per cent jeeping, glass reinforcement, rock shield, ditch padding, and other "extras" calculated to improve performance of coatings. The western 178 miles was coated over the ditch with coal-tar enamel and felt. The coating job was inspected visually, with a holiday detector used occasionally. The hot coating was lowered onto unpadded skids and the damage at each skid was repaired before the pipe was lowered into the ditch. Even though 120 miles was through rock ditch, no rock shield was used nor was the ditch padded. At $200 per mile for jeeping, $400 for glass, and $2,380 for rock shield, the extras would have increased the job by about $392,400, or an overall average of about $2,200 per mile.

The line is now completely protected. Cost of installing cathodic protection amounted to $37 per mile. Total operating expense of the protection amounts to only $4.80 per mile per year even with one of the pump stations collecting 65 per cent of the current. The current required for protection may increase somewhat. It could double without much increase in cost since the rectifiers are operating considerably below their capacities. A fourfold increase in current demand would possibly double the protection costs; but can $400 per mile be invested in glass or can $2,380 per mile be invested in rock shield to save $5 or $10 per mile per year cathodic protection expense? Just the interest on a $200 per mile investment in jeeping exceeds the total annual expense of cathodic protection.

The coating on the eastern portion of the 18-in. was reinforced with glass and it was jeeped in its entirety. It cost $1,100 per mile more than the coating on the western portion. Nevertheless, its performance is just about the same.

Protection costs of the Skidmore-Ingleside lines show that bare or practically bare pipe is expensive to protect so a "good" coating is needed for minimum total costs.

**Conclusions . . .** Inspection data and the figures on cost relationships between coating practices and cathodic protection requirements that have been presented here indicate that:

1. Even the best coatings are not free from imperfections and require cathodic protection to fully protect the pipe.

2. The cost of cathodic protection on reasonably well-coated lines is so small that expense and efforts to secure more than a "good" coating are difficult to justify. Items of such expense include coating reinforcements, complete holiday-detector inspection, rigid insistance on holiday-free coatings, rock shield, and ditch padding.

3. When supplemented with cathodic protection, the maximum coating for general use appears to be 3/32-in. pipeline enamel wrapped with felt.

4. Lowering hot coatings directly into the ditch creates many coating penetrations but does not increase cathodic protection costs appreciably.

5. No significant difference exists between performance of coatings applied over the ditch and yard-applied coatings. Choice between the two methods should be based on cost, terrain, and weather conditions.

6. Though the industry is ever alert for better materials and methods for improving coatings their use can be justified only if over-all protection costs are reduced. At the present time the only significant reduction which can be made is in the cost of the coatings themselves.

## Mobility and Flexibility

*(Continued from page 129)*

the pump pinion shafts for phase-controlled parallel operation. A coupling-type clutch in the assembly connecting the pinion shafts permits selection of the most desirable phase relationship between pumps during parallel operation to assist in minimizing pressure pulsations. Phased parallel operation, used in conjunction with torque converters, relatively low inertia chain drives, the pulsation dampeners are expected to minimize pump and other hydraulic-system maintenance costs when operating under heavy loads.

**Drill string . . .** Drill pipe for use with this rig was selected on a compromise basis between light weight for efficient hoisting and maximum size to permit effective hydraulic horsepower utilization for jet-bit drilling through the efficient hoisting depth range of the rig. The pipe chosen was 4½-in. o.d., N-80, plain-end tubing, with a 0.271-in. wall, internally upset and equipped with pressure-welded 3½-in. A.P.I. IF hard-faced tool points (4¾-in. o.d.). For this practically flush joint, safety-lock elevator lift plugs are used.

Weight of the pipe with tool joints is approximately 13.5 lb. per ft., which increases the effective hoisting depth rating by 28 per cent, when compared with 4½-in., 16.60-lb. per foot drill pipe. Collapse resistance is approximately 20 per cent less than for 4½-in., 16.60-lb. per foot drill pipe. With this light-weight pipe and the available pump capacity, annular velocities of 175 ft. per minute in 8¾-in. hole, nozzle velocities in excess of 280 ft. per second, and 165 hydraulic bit horsepower can be obtained at 7,000 ft.

**Power distribution . . .** For power distribution while drilling, several combinations are practicable, principally as a result of having the clutch-equipped connection between the pinion shafts of the pumps. The two draw-works engines can be split with one engine driving the rotary table and the rear engine, in conjunction with the two engines mounted on the No. 2 pump skid, driving the pumps for parallel operation.

Also for parallel operation, all four engines can be compounded to drive the two pumps and rotary, simultaneously. For single-pump operation, the draw-works engines can be compounded to drive the rotary and the No. 1 pump, with this pump being used for mud mixing, while circulation for drilling is maintained with the independently powered No. 2 pump.

The control panel which is located at the driller's position, provides for excellent flexibility of power distribution under varying operating conditions. Separate throttles for each engine on the draw works and the slush-pump engines can be combined on a common actuator, or split in any combination to reduce the manipulations required by the driller when operating with any particular distribution of power.

For hoisting service the two draw-works engines would normally be compounded. However, in an emergency, it would be possible to have one or both draw-works engines out of service and power the draw works with the skid-mounted engines on the No. 2 pump. This is done by driving through the pump pinion shafts, when connected for phased parallel operation, and through the torque tube from the No. 1 pump to the rig compound. The pump discharges would be open to the pits in such a situation.

Transmission of power from the pump engines to the draw works in the manner described becomes apparent from observation of Fig. 1. This inefficient method would, of course, only be applied under emergency conditions.

T. P. R. C. REPORT:

# Atlantic's High-Pressure Gas Process Being Used In West Texas' Block 31 Field

by Dr. E. R. Brownscombe

ATLANTIC'S high-pressure-gas process is applicable to deep high-pressure reservoirs. It is being used currently in the Devonian reservoir of the University Block 31 field, an 8,000-ft. limestone reservoir of West Texas. This article will cover briefly what types of reservoirs are susceptible to high-pressure gas injection, what recovery is expected at Block 31, and how this compares with water flooding and with natural depletion recovery.

When we start to produce a field, the pressure drops and water around the edge of the field starts to flow in. Often, the amount of water coming in is not enough to maintain the pressure, so that the principal agent driving the oil out of the reservoir is gas coming out of solution from the oil. In this case, we have a solution-gas drive.

Gas, having a low viscosity, is not very effective in pushing oil out as it flows through the reservoir. This accounts for the low recoveries frequently obtained by natural depletion. This situation may be improved by injecting gas, but, at conventional pressures, very large volumes of gas are required to get high oil recoveries.


THE AUTHOR

**Dr. E. R. Brownscombe is associate director of production research, Atlantic Refining Co., Dallas. He holds B.S. and Ph.D. degrees in physical chemistry from Yale, and joined Atlantic in 1934. Since that time he has worked on various phases of refining and production research. This paper presented at Texas Petroleum Research Committee symposium, Tyler, Tex., May 7, 1954.**


TABLE 1—ESTIMATED RECOVERIES FOR UNIVERSITY BLOCK 31 FIELD COMPARING HIGH-PRESSURE GAS INJECTION WITH WATER FLOODING AND WITH NATURAL DEPLETION

| Factor— | Method of production— Natural depletion | Water injection | High-pressure gas injection |
|---|---|---|---|
| Fraction of reservoir swept | | 81 | 58 |
| Unit displacement efficiency (ultimate) | | 50 | 90 |
| Per cent oil in place recovered | 25 | 40 | 52 |

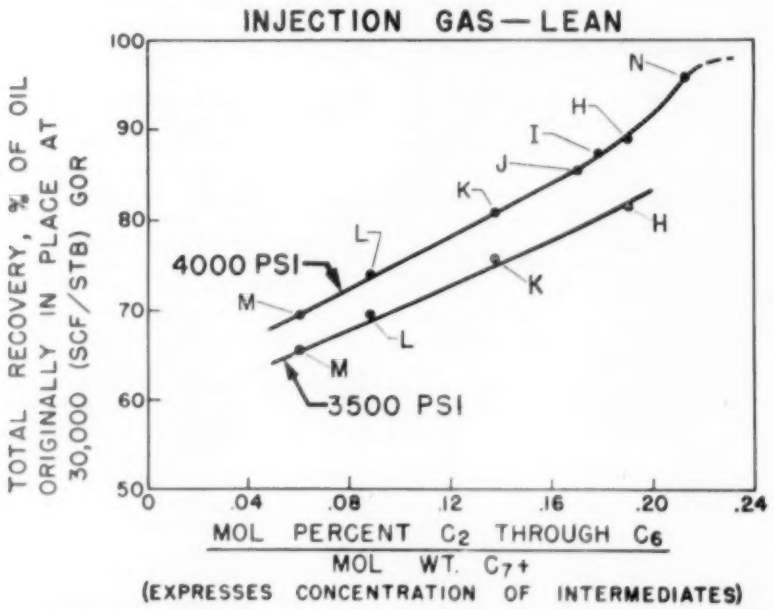



Fig. 1—Effect of injection pressure and concentration of intermediates in reservoir fluid on recovery.

Of course, if there is substantial water drive, or if water is injected, a much higher recovery is usually obtained because water is more viscous than gas and tends to force out more oil as it flows through the reservoir.

Let us consider the high-pressure gas-injection process we are using at Block 31. We are injecting gas under such high-pressure conditions that the anticipated recovery is higher than water would give, and much higher than would be obtainable with gas at conventional pressures.[1]

By high-pressure gas injection in oil reservoirs, we mean injection at such pressures that the reservoir oil is undersaturated (pressures above that required to dissolve all the gas) and further, such pressures that a miscible zone is built up between the reservoir oil and the injected gas.

This phenomenon of a gas becoming miscible with oil—that is, completely soluble in it in all proportions just as if it were a hydrocarbon liquid—comes about when we raise the pressure high enough. Under these conditions, then, the oil in effect is being washed out of the reservoir, much as if it were being washed out with kerosine or some other solvent, so that recoveries are very high from that part of the reservoir which is swept by the injected gas.

The pressures required for this process generally are 3,000 psi. or above. This means a depth requirement of, say,

*(Continued on page 135)*

Fig. 1—Top and bottom threads of this furnace header plug damaged in sandblasting.

Fig. 2—Before being chemically cleaned, this is how one furnace header plug looked.

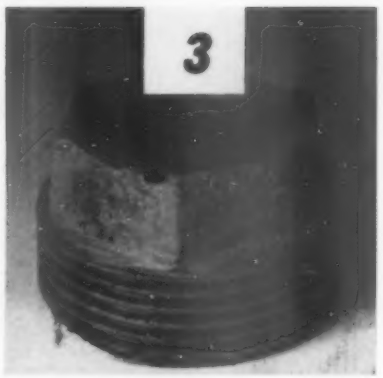



Fig. 3—After chemical cleaning, this is how the same plug looked.

*Refinery tests show . . .*

# Less Metal Loss From Chemical Cleaning

**by N. H. Prater**

REFINERY equipment must be cleaned periodically to remove rust and scale accumulated in service. This can be done mechanically or chemically. The relative value of the two methods was compared on a polyform furnace operated at 1,500 psig. and 1,050° F. maximum temperature. An alloy containing 2.25 per cent chromium, 1 per cent molybdenum, and 96.75 per cent iron was studied. The experimental work was carried out as follows:

Test specimens made of the same material as the furnace header plugs were located in the headers. These specimens were removed at every turnaround and cleaned by sandblasting or chemically. The loss of metal after each cleaning was determined by weighing. The results obtained after four turnarounds were averaged.

**Sandblasting** was very effective for removing rust and scale. The average metal loss per unit area of the specimens after each cleaning was constant but in some instances more metal was removed than necessary, indicating that the equipment could be rendered unsafe for further use. Fig. 1 shows the top and bottom threads of a furnace header plug damaged by sandblasting.

**Chemical cleaning** was also highly effective. Solutions containing 30 per cent by weight of hydrochloric acid and various corrosion inhibitors were employed. The specimens were kept in the solution at normal temperatures (90° F.) and inspected at 10-minute intervals for a total length of 2 hours. The rust and scale were removed in 30 minutes or less by all the solvents tested. Removal of scale deposits was completed in 20 minutes or less if the solvents were agitated. Photographs of a furnace header plug before and after cleaning with solvents are shown in Figs. 2 and 3, respectively.

The loss in weight of the specimens after cleaning was converted to inches of penetration. The results of the tests are shown in Table 1.

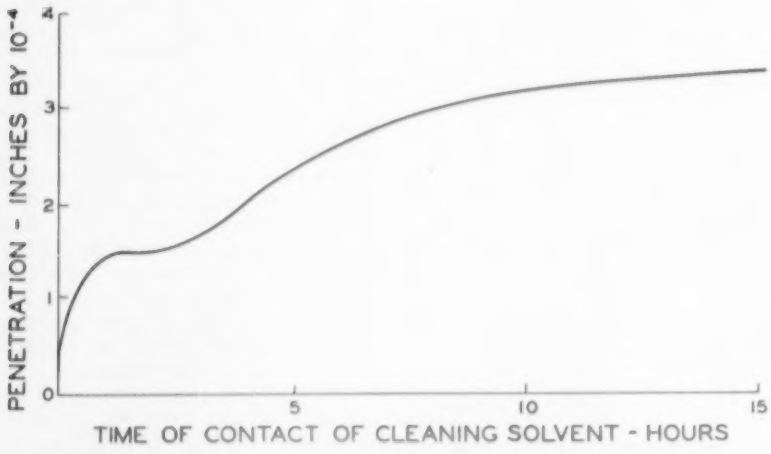



Fig. 4—Rate of penetration observed on alloyed steel cleaned with chemical solvents.

**TABLE 1—COMPARISON OF RATES OF METAL LOSS BY SANDBLASTING AND CHEMICAL CLEANING**

| No. of cleanings | Total metal loss, in. | | Difference, in. | Per cent |
|---|---|---|---|---|
| | Mech. | Chem. | | |
| 1 | 0.0480 | 0.0451 | 0.0029 | 6 |
| 2 | 0.0965 | 0.0902 | 0.0063 | 7 |
| 3 | 0.1440 | 0.1352 | 0.0087 | 6 |
| 4 | 0.1922 | 0.1804 | 0.0118 | 6 |

The difference in penetration after each cleaning period shows the increase in metal loss contributed by sandblasting. After four cleanings, the sample cleaned by sandblasting showed an increase of 0.0118 in. of penetration or 6 per cent over chemical cleaning.

The data in Table 1 indicate the average metal loss of all test specimens after each unit turnaround. Although the loss of metal caused by sandblasting is relatively constant the loss was

THE AUTHOR

**N. H. Prater, with the technical department of the refining division of Magnolia Petroleum Co., Beaumont, Tex., is a native of Birmingham, Ala. After 2 years of service in the U. S. Navy, he attended Georgia Tech and received his B.S. in chemical engineering in 1951. He joined Magnolia's refining division upon graduation, and has worked primarily in distillation and light-ends handling.**

not evenly distributed. Pits were observed on the sandblasted specimens showing a rapid decrease in thickness at some spots on the metal surface. These pits were not observed on the samples cleaned chemically.

The actual wear of the metal was twice as high in sandblasting as that shown in Table 1 because of local wear. The wear was particularly noticeable at the pipe threads. Under average conditions pipe threads cannot stand more than four sandblastings before they must be replaced. Threads cleaned chemically appeared unharmed.

**Chemical cleaning . . .** Chemical cleaning cannot be used on all occasions. Success of cleaning depends on composition and condition of the scale. When an insoluble scale is encountered, use of mechanical methods is necessary. For example, several of the test samples were allowed to remain in the furnace headers for four unit turnarounds without cleaning. These samples were covered with a hard coke-like deposit.

This material was not effectively removed chemically. For best results, cleaning with chemical solvents should be a regular routine operation during every turnaround. Scale deposits should not be allowed to build up since scale composition becomes more complex and harder to dissolve as scale thickness increases.

Several fresh specimens of metals were tested to determine the effectiveness of the corrosion inhibitors. These samples were allowed to remain in contact with the cleaning solvents for a total length of 18 hours. The samples were weighed at 30-minute intervals to determine rate of metal loss. Samples of the solvent were taken during the test period. When no change in solvent concentration was observed between successive samples, the solvent was considered spent.

The results are plotted in Fig. 4 in the form of a time-penetration curve. This curve is of interest for establishing metal loss with time. The greatest rate of penetration occurred during the first hour of contact with the cleaning solvent. After 1 hour of contact the rate of penetration became constant but then increased again though the rate of increase was less than that observed at the beginning of the tests. The formation of this plateau might be explained by the temporary formation of a protective film on the metal surface by the inhibitor which retards penetration. The inhibitors added to the cleaning solvents were slow in providing a protective coating, and for short cleaning periods full value of the inhibitors has not been realized.


### Acknowledgment

The author is grateful to Magnolia Petroleum Co. for permission to publish this article and to V. A. Kalichevsky for his helpful suggestions and criticisms.


## Atlantic's High-Pressure Gas Process

*(Continued from page 133)*

6,000 ft. or greater, depending partly on the temperature and gas-oil ratio of the reservoir oil, but mainly on the amount of intermediates in the reservoir. Intermediates are those constituents intermediate between gas and black oil—constituents such as L.P.G. and natural-gasoline components—which are effective in reducing the pressure required to make gas and black oil miscible.

The effects of intermediates in the reservoir oil on recovery (for laboratory runs) is shown in Fig. 1. The mole per cent ethane, propane, butane, pentane, and hexane divided by the molecular weight (or heaviness) of the heavy ends of the reservoir oil is taken as a measure of the amount of intermediates in the reservoir oil.

Block 31 fluid is point H. Point N represents a 50.5° A.P.I. oil of 2,300 gas-oil ratio. Point M is a 410-gas-oil ratio oil of 36.5° A.P.I. Note that the intermediate content of the reservoir oil has a considerable effect on the recovery. Restating this, we can say that generally high-gravity oils containing considerable propane and butane are favorable for the process.

We have not mentioned the composition of the injected gas. It is of minor importance in this process for the following reason: There is always some residual oil left behind in a displacement. The injected gas in passing over this residual oil comes into equilibrium with it, so that by the time the injected gas approaches the front where it is displacing oil, its content of intermediates is largely determined by the amount of intermediates it has picked up as it passes over this residual oil.

In order to give a comparison of high-pressure gas displacement with other types of recovery, recoveries are presented as estimates for Block 31 by various methods of operation.

The first two rows in Table 1 give a breakdown to show the fraction of the reservoir swept and the recovery from the part of the reservoir which is swept. The latter is the recovery given by laboratory runs. The two numbers are multiplied to give the per cent recovery.

Natural depletion, mainly solution-gas drive with some help from edge water, is estimated to yield 25 per cent recovery. Water gives a fairly high fraction of the reservoir swept, 81 per cent, but this particular rock has a poor response to water, only 50 per cent recovery from the part of the reservoir which is swept. This gives a total recovery of 40 per cent water.

The high-pressure-gas process as presently operated is estimated to give 52 per cent recovery at Block 31. The sweepout, 58 per cent, is lower than that for water because of the low viscosity of the gas. The recovery from the swept volume, 90 per cent, is very high because miscibility is attained at the front. That is, as was mentioned earlier, the enriched gas at the front is acting like a solvent for the oil, so that the oil is literally washed out of the reservoir. This efficient action more than makes up for the lower volume swept.

In conclusion, the high-pressure-gas process makes use of high pressures (3,000 psi. and above) to obtain miscibility between reservoir oil and injected gas. This leads to recoveries of 90 per cent or more from the swept volume of the reservoir, with possibilities of over-all recoveries substantially better than are obtainable by water or conventional gas injection. In deep reservoirs, particularly if the reservoir fluid is undersaturated and is rich in intermediates, Atlantic's high-pressure-gas process should be considered as a means of increasing oil recovery.

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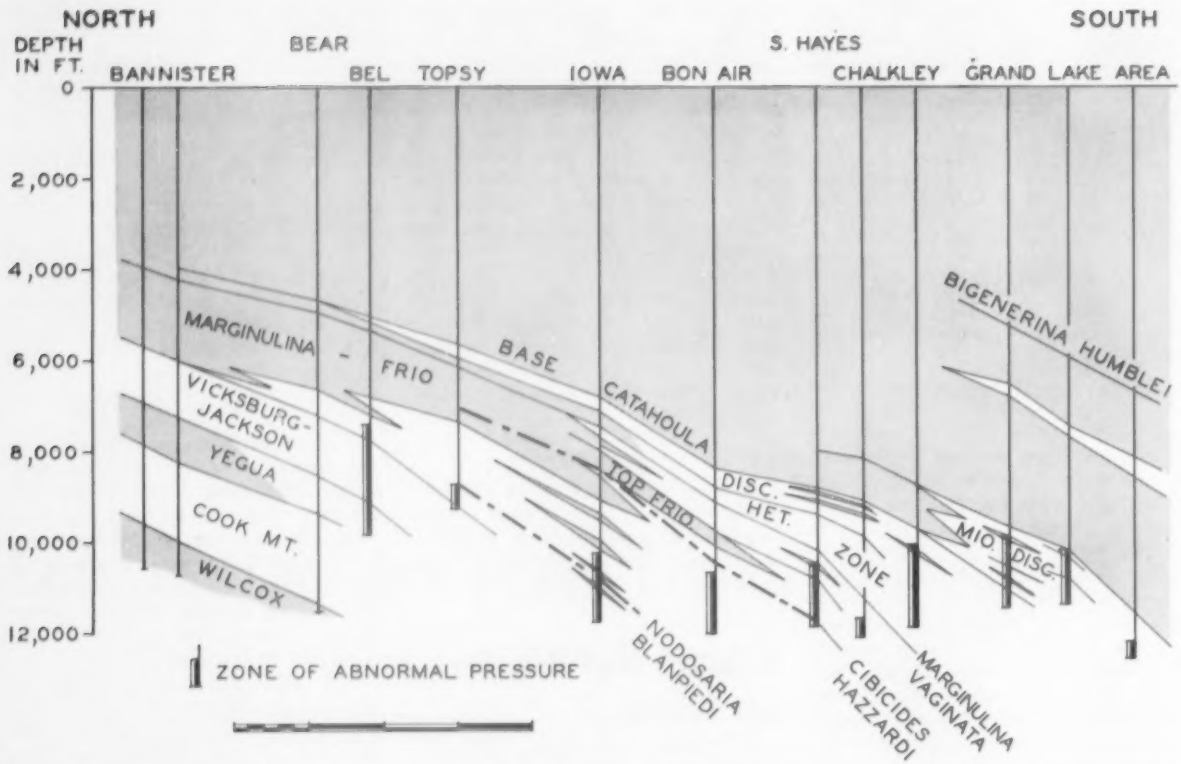


Fig. 1—Diagrammatic stratigraphic section (western area) illustrating facies control of abnormal pressure reservoir. (From George Dickinson).

# Danger Below! Abnormal Reservoir Pressures

## Failure to anticipate and overcome them in time can mean blowouts, loss of hole, and worse!

**by J. A. Kornfeld**

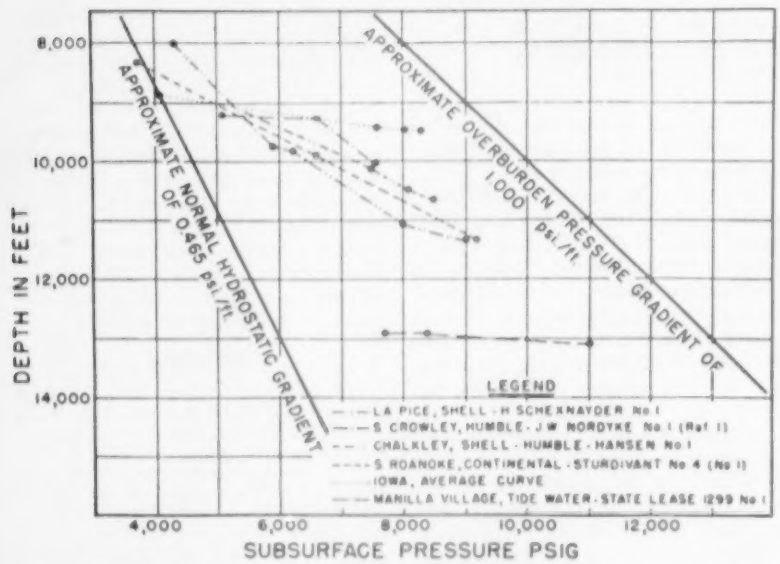
8,000
10,000
12,000
14,000
DEPTH IN FEET
APPROXIMATE NORMAL HYDROSTATIC GRADIENT OF 0.465 psi/ft.
APPROXIMATE OVERBURDEN PRESSURE GRADIENT OF 1.000 psi/ft.
LEGEND
LA PICE, SHELL - H SCHEXNAYDER No 1
S CROWLEY, HUMBLE - J W NORDYKE No 1 (Ref 1)
CHALKLEY, SHELL - HUMBLE - HANSEN No 1
S ROANOKE, CONTINENTAL - STURDIVANT No 4 (No 1)
IOWA, AVERAGE CURVE
MANILLA VILLAGE, TIDE WATER - STATE LEASE 1299 No 1
4,000
6,000
8,000
10,000
12,000
SUBSURFACE PRESSURE PSIG

Fig. 2—Reservoir pressure-depth curves for typical Louisiana Gulf Coast wells. (From George Dickinson).

HIGH-PRESSURE zones occur in a belt about 50 miles wide inward from the coast line of the Gulf Coastal plain from the Rio Grande to the Mississippi Delta. Extent of this belt into offshore areas is known in a limited manner since only about 60 structures have been tested in the offshore waters.

Concentration of an abrupt increase in reservoir pressure above normal hydrostatic pressure occurring commonly over a very short vertical interval makes drilling control difficult. Failure to anticipate these abnormal pressure zones and to overcome these pressures in time can mean blowouts, loss of a hole, and sometimes cratering and loss of a rig.

Determination of the depths at which abnormal pressures may be encountered in exploration wells is of prime interest to the drilling and mud engineer, particularly in the Gulf Coast province. Fig. 1 shows a geologic cross-section of the Mississippi Delta area of South Louisiana and demonstrates clearly the nature of facies control on abnormal reservoir pressure.

Dickinson[1] analyzes that: "abnormal

Author is petroleum consultant-geologist, Tulsa.

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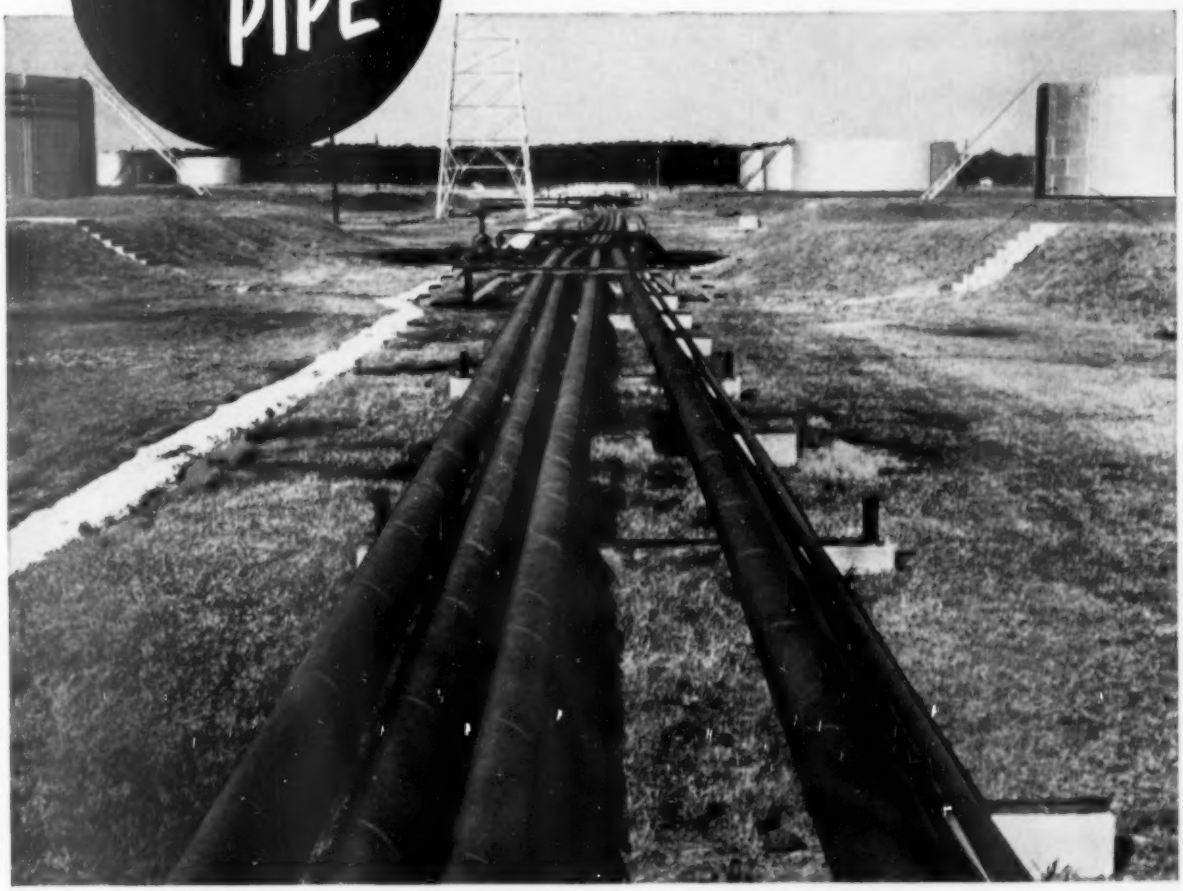

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## ARMCO WELDED STEEL PIPE

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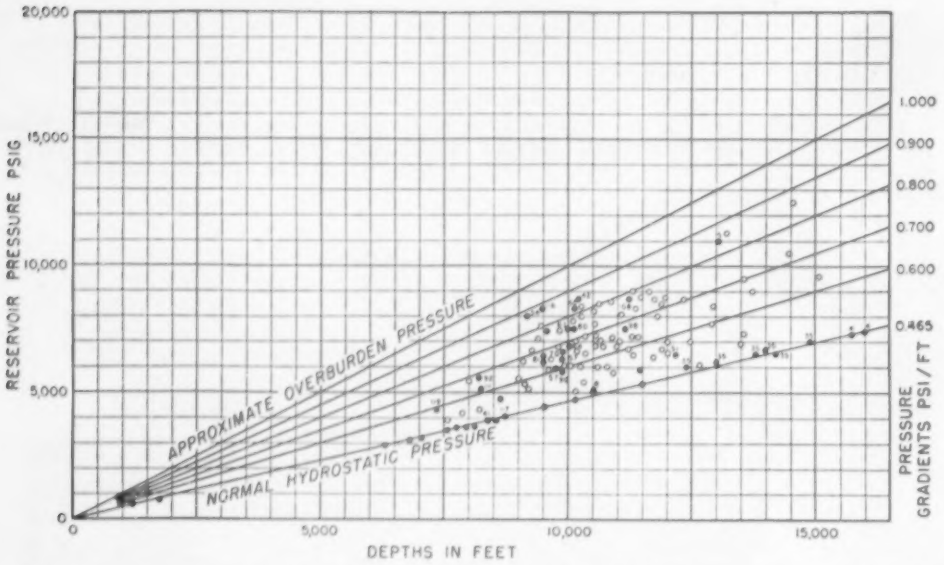


**Fig. 3—Reservoir pressure vs. depth for Louisiana Gulf Coast wells. Solid circles: measured pressures. Open circles: estimated pressures. (From H. D. Hedberg).**

pressure commonly occurs only below the base of the main sand development in or below a major shaly series." In addition to conditions shown in this figure, high pressure may also be found in the main sand series where conditions are favorable for isolation of sand bodies by faulting or lensing out of the reservoir, e.g., Venice, Lirette, or Darrow, La.

**Geologic age . . .** Geologic position of the facies change from mainly sand to mainly shale in South Louisiana occurs at the base of the Frio formation. However, the position of the facies change rises in the section into the Miocene, as in the Mississippi Delta area shown in Fig. 1.

Occurrence of abnormal pressures below an unsuspected fault is known in La Pice, Louisiana, field. This type of abnormal-pressure occurrence is particularly difficult to control. However, use of a paleontologist to "sit on the well" during drilling operations, particularly before critical geological sections are drilled, can assist in identification of a shortening of section through continuous study of the microfauna in the drilling cuttings. Once a major fault has been cut, the mud weight can be increased before a porous zone is penetrated.

Once the zone containing abnormal reservoir pressure has been reached, reservoir pressure may follow either of two trends, as shown in Fig. 2:

- A sharp increment from hydrostatic to geostatic pressures (i.e., Iowa or Manilla Village, Louisiana, or
- A less-rapid increment, i.e., Chalkley, South Roanoke, or La Pice, Louisiana.

**Magnitude of zones . . .** Data are limited as to the areal and vertical extent of porous zones which exhibit abnormal reservoir pressures. However, most of these occurrences are found on faulted structures. Generally, abnormal pressures are observed in thin sands containing salt water and in some places, gas. Exceptions to this rule are Iowa, Chalkley, St. Gabriel, and Manila Village, Louisiana, where some very high oil and gas zones have been logged.

Reservoir volumes of these sand lenses vary widely. Size may vary from a small lens to a very large aquifer. Size of a small lens is inferred from rapid pressure drop or rapid reduction in flow rates of gas or salt water. A large aquifer supplied the Bel, Louisiana, crater which produced 7 million barrels of salt water with very little noticeable reduction in flow rate.

**Definition . . .** Abnormal reservoir pressure has been defined by Dickinson[2] as "any pressure which exceeds the hydrostatic pressure of a column of water containing 80,000 p.p.m. total solids."

Throughout the Gulf Coast province, most wells encounter subsurface pressures which generally approximate the hydrostatic pressure of a column of water containing 80,000 p.p.m. total solids, or exhibit a pressure gradient of 0.465 psi. per foot of depth.

Normal reservoir pressure is the effect of a head of water occupying interstitial space and in communication with the surface. Geostatic pressure or the pressure caused by weight of overburden is a related factor. Maximum reservoir pressures known approach 90 per cent of geostatic pressure. In the Gulf Coast province, geostatic pressure gradients approximate 1.0 psi. per foot of depth.

**Shale density vs. depth . . .** Newly deposited argillaceous sediments exhibit a density of about 1.8; in these formations, interstitial water occupies from 60 to 90 per cent of pore space.

Dickinson's data for Gulf Coast Tertiary sandstones plotted in Fig. 2 show a maximum density for the Miocene of 2.51 at about 15,100 ft.; this example lies in the Weeks Island, Louisiana, field. This example compares with a density of 2.58 for Eocene Wilcox sandstone found at about 8,600 ft. at Provident City, Tex.

In samples taken at 15,000 ft. it has been found that compaction processes are still taking place. Hedberg[3] has indicated a maximum density of 2.65 for the ultimate density of shale with little or no porosity.

Gradients for a number of coastal Louisiana oil and gas fields are plotted as parameters in Fig. 3 which shows the plot of both the hydrostatic pressure and the geostatic pressure.

**References**

1. Dickinson, George, "Geological Aspects of Abnormal Reservoir Pressures in Gulf Coast Louisiana," Bull. A.A.P.G., Vol. 37, No. 2 (February 1953), pp. 410-432.

2. Ibid.

3. Hedberg, H. D., "Gravitational Compaction of Clay and Shales," Amer. Jour. Sci., 5th Ser. Vol. 31, No. 184 (April 1936), page 279.

"Abnormal pressures below an unsuspected fault . . . are particularly hard to control. Use of a paleontologist to 'sit in on the well' during drilling operations . . . can help."

# OPERATING COSTS... AND PLANT LOCATION

The ability of a company to make and maintain cost reduction is especially significant now that vigorous competition and a buyers' market are back.

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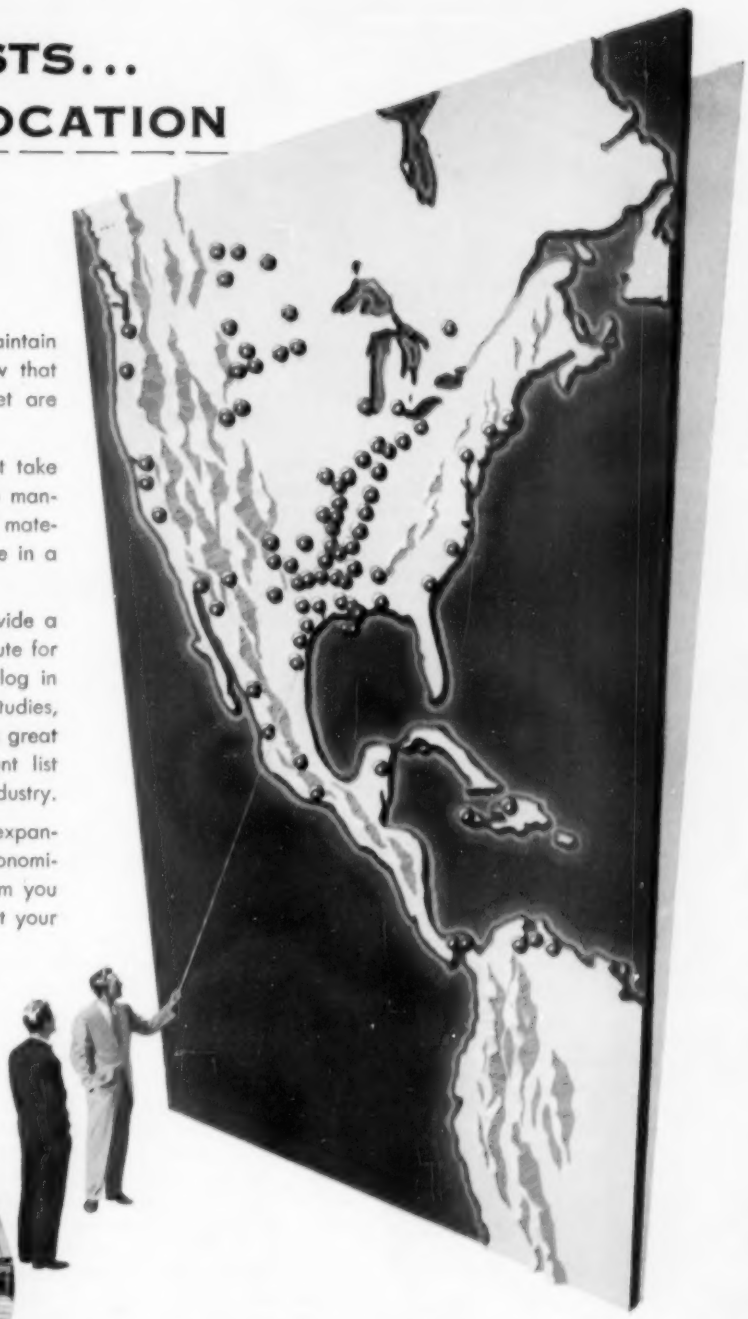

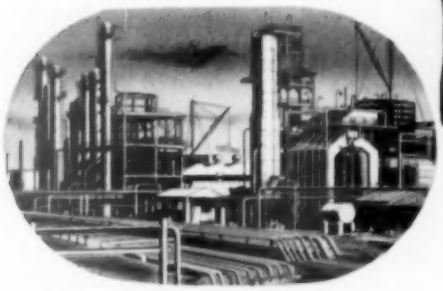

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**HYDRAULIC POWER enables this tensile tester not only to test this crooked joint for strength in tension but also to straighten the joint. Both jobs are made possible by the hydraulic rams on either side that exert powerful longitudinal pull.**

# New Tensile Tester Grades and Straightens Drill Pipe, Tubing

**by Ed McGhee**
**Drilling-Production Editor**

A HYDRAULICALLY operated tensile tester for drill pipe and other tubular goods is now being used by drilling contractors and operators in some areas. The new machine not only grades the pipe in tension, but also brings it to a straightness comparable to new pipe.

**THIS SMALLER MODEL of the hydraulic tensile tester is used to test and straighten tubing. Though the metal reaches the yield point, there is no appreciable elongation of the joints.**

The device pulls pipe joints by means of special subs screwed onto both ends, so that the joint is tested over its entire length including threads. It has been used successfully on small-diameter casing, line pipe, sucker rods, drill pipe, and tubing. The only limitation is that the joint connection must be stronger than the body of the pipe, as is the case with most oil-field tubular goods.

As in any other system, the metal must be brought to the yield point to restore original straightness, but resistance to fatigue is in no way reduced. Any joint of drill pipe that will not bear its rated tensile load is detected. If the metal pulls completely in two before the yield point is reached, the joint is, of course, discarded.

If the yield point is reached at a point less than the standard tensile load rating, the joint may be graded as being a specific degree substandard. It may then be used in a portion of the string where its lesser strength will not be hazardous; or it may be used in shallow wells that do not call for high tensile loads.

In this manner the investment in pipe may be exploited to the utmost without incurring danger of failure.

The machine is mounted on a four-wheel trailer so that it may be spotted by the pipe racks either at a drilling well or in a yard. Developed by A. P. Heldenbrand, of Heldie's Machine Works, Oklahoma City, the tester is operated as a service and is available in several areas throughout the country.

**Hydraulic rams . . .** The tensile load is applied to pipe by means of two horizontal hydraulic rams which are on either side of the machine. Power is provided by an air-cooled engine mounted on the unit.

A hydraulic lift is mounted between the rams and assists in putting the joints on and off the machine. It is projected to add a weighing mechanism to this lift as a further aid to grading pipe.

Fluid pressure behind the rams forces them to expand, and yokes on their ends engage the subs on the pipe joint. The machine operator allows the rams to elongate until fluid pressure shows that the yield point has been reached. If the joint is sound, it comes out straight and without appreciable elongation.

Some contractors are using this tensile test in combination with internal pressure testing. When pressure-tight subs are used for the pulling operation, water may be pumped into the joint to subject it to any predetermined internal pressure. It is felt that this combination test is more nearly comparable to actual service conditions.

In one area of the Rocky Mountains, there were several instances of drill-pipe failure in deep wells, resulting in expensive fishing jobs. For that reason, it was decided to test new pipe before putting it into service. While only a small fractional per cent of the new pipe failed to meet minimum specifications, enough drill-string failures were eliminated to make the testing attractive to both contractor and manufacturer.

# New Life for Livingston No.8

**RAPID LEVELING OF A DRILLING SITE** is accomplished by this INTERNATIONAL TD-14A crawler tractor, owned by H. S. and B. Oil Field Construction, Wewoka, Oklahoma.

## INTERNATIONAL TD-14A Helps Reclaim Damaged Well

When the pipe went bad on City Service Company's Livingston Number 8 well in the field outside of Seminole, Oklahoma, company engineers decided there was nothing to do but shut down operations and redrill.

Toughest part of the job was leveling and digging pits at the new drilling location. Although the hilltop site was dotted with big, deep concrete footings from the previous well, the INTERNATIONAL TD-14A crawler tractor owned by H. S. and B. Oil Field Construction leveled the area, rooted out the old footings and dug pits on the 200-square foot area in less than four days.

Like Hayes Streater, a partner in H. S. and B. Oil Field Construction, says:

*"There's just no better oil field tractor than the* INTERNATIONAL *TD-14A. If a pit can be dug, a TD-14A will do it. In fact, we can dig pits with straight up ends that other crawlers can't get out of.*

*"And another thing: There's no crawler in the same horsepower field that can match the TD-14A for low cost maintenance and operation."*

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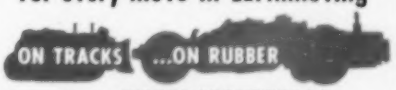


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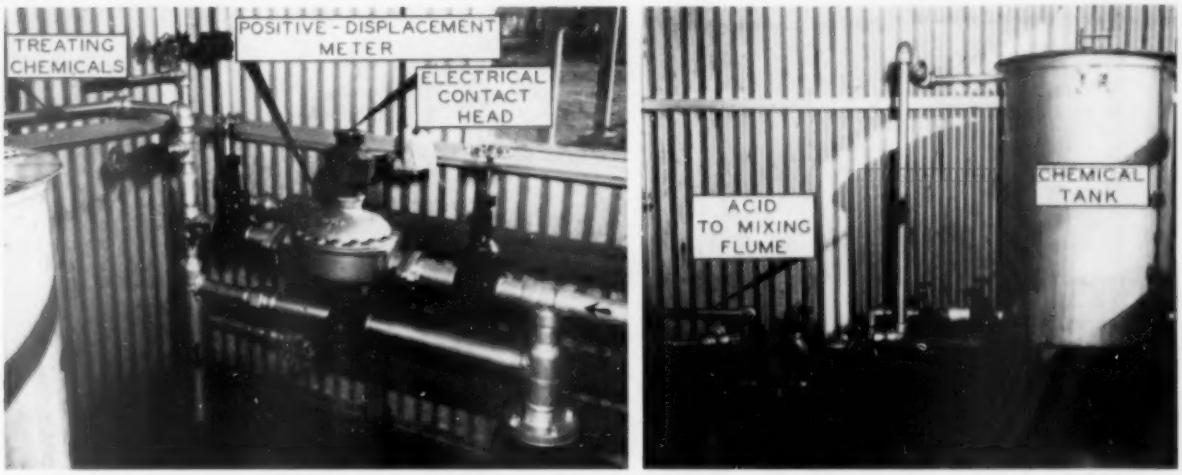


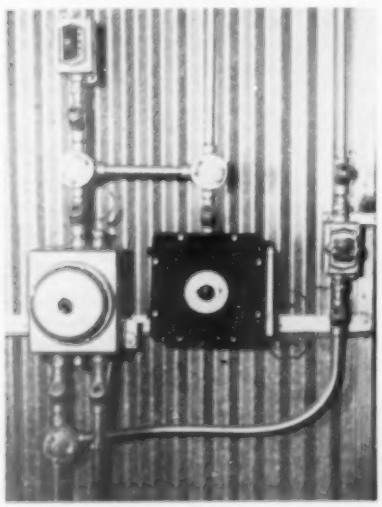

**Cooling-tower makeup water at Etter, Tex., Kerr-McGee gasoline plant goes through positive-displacement meter equipped with electric contact head to actuate cycle timer. This operates a duplex pump, one side of which handles acid and the other side chemical solution.**

# Treating cooling water in open system

**by R. W. Kelly**

A SIMPLE yet highly efficient setup for treating cooling water in an open system has been installed in the Kerr-McGee gasoline plant at Etter, Tex. The system has proved very satisfactory in use. Advantages include:

- **Low cost.** A minimum of equipment is involved, a large portion of which can be salvaged from idle equipment on hand in the average plant.
- **Positive control.** A positive-displacement water meter and controlled volume pumps are used in the setup to insure control of ratio of chemicals to makeup water.
- **Automatic operation.** The chemicals pump is actuated by a cycle timer, which it is preset to run the pump the required amount of time, needs no attention from the operator.



**Length of operation of duplex proportioning pump is determined by the cycle timer.**

**How it works . . .** Makeup water flowing to the cooling tower passes through a positive-displacement meter. An electric contact head is installed on this meter to make contact after a certain amount of water has passed through.

When contact is made, a cycle timer, set to operate a duplex proportioning pump, is actuated. The pump is used to proportion acid and other desired treating chemical into the water stream. Length of pump operation is predetermined by setting the cycle timer as desired.

The duplex pump is used to cut down on cost of the installation. In some instances it may be more desirable to use two simplex pumps. In this case, two cycle timers would give greater flexibility to the system.

One side of the pump is fitted for concentrated sulfuric acid, while the other is fitted for supplementary treating material. The exact material depends on the job and the choice of the operator.

The acid is pumped to a baffled wooden flume where it is mixed with the makeup water prior to its entering the cooling towers. The supplementary chemical solution is mixed with the makeup water on the downstream side of the positive-displacement meter.

## Collection Point for Oily Rags

TO eliminate the possibility of creating a serious fire hazard, the safety engineer at El Paso Natural Gas Co.'s Farmington, N. M., gas-treating plant designed the trash disposal can shown below. It serves as a collection point for oily rags that formerly were often piled on the plant floor where they created a definite fire hazard. Now all waste rags, wiping cloths, paint rags, and other trash are pushed through the chute opening inside the plant into the trash can outside.

# 1953

# Second Largest Sales Year for Anglo-Iranian as World Operations Continue to Expand

1953 was marked by a growing rate of expansion in Anglo-Iranian operations. In the second full year without oil from Iran, sales were 14 per cent over 1952 and achieved their second highest level in company history, being exceeded only by the record volume of 1950 with full production in Iran. To maintain its position in the face of severe competition in world markets, the company has made heavy capital expenditures—$160,000,000 in 1952; $210,000,000 in 1953; $168,000,000 scheduled for 1954—chiefly for refineries. By the end of 1955, total refining capacity should be nearly 610,000 barrels a day, compared with over 406,000 barrels last year and 640,000 in 1950. The commissioning of Aden refinery on the Red Sea and Kwinana refinery in Western Australia will enable markets East of Suez to be supplied more economically.

*Copies of the Annual Report and Accounts may be obtained from the Company's Purchasing Agent in U. S. A., Mr. J. E. Anderson, 610 Fifth Avenue, New York 20, N. Y.*

### *Crude Production*

Anglo-Iranian's crude oil production in the Middle East was substantially higher in 1953, when its daily offtake from Kuwait, Iraq and Qatar rose to some 654,000 barrels compared with 519,900 barrels in 1952. Kuwait again was the major source of supply, providing 473,500 barrels daily against 402,500. Production began in February 1953 from the northerly extension of the Burgan field where there were 22 producing wells by the year-end, 13 wells having been completed during 1953.

### *Refining*

Total refinery throughput during 1953 was 406,200 barrels daily, over 40,600 barrels above 1952—chiefly the result of commissioning the new 80,000 barrel-a-day Kent refinery near London. Antwerp and Hamburg refineries will increase capacity during 1954. The 120,000 barrel-a-day Aden

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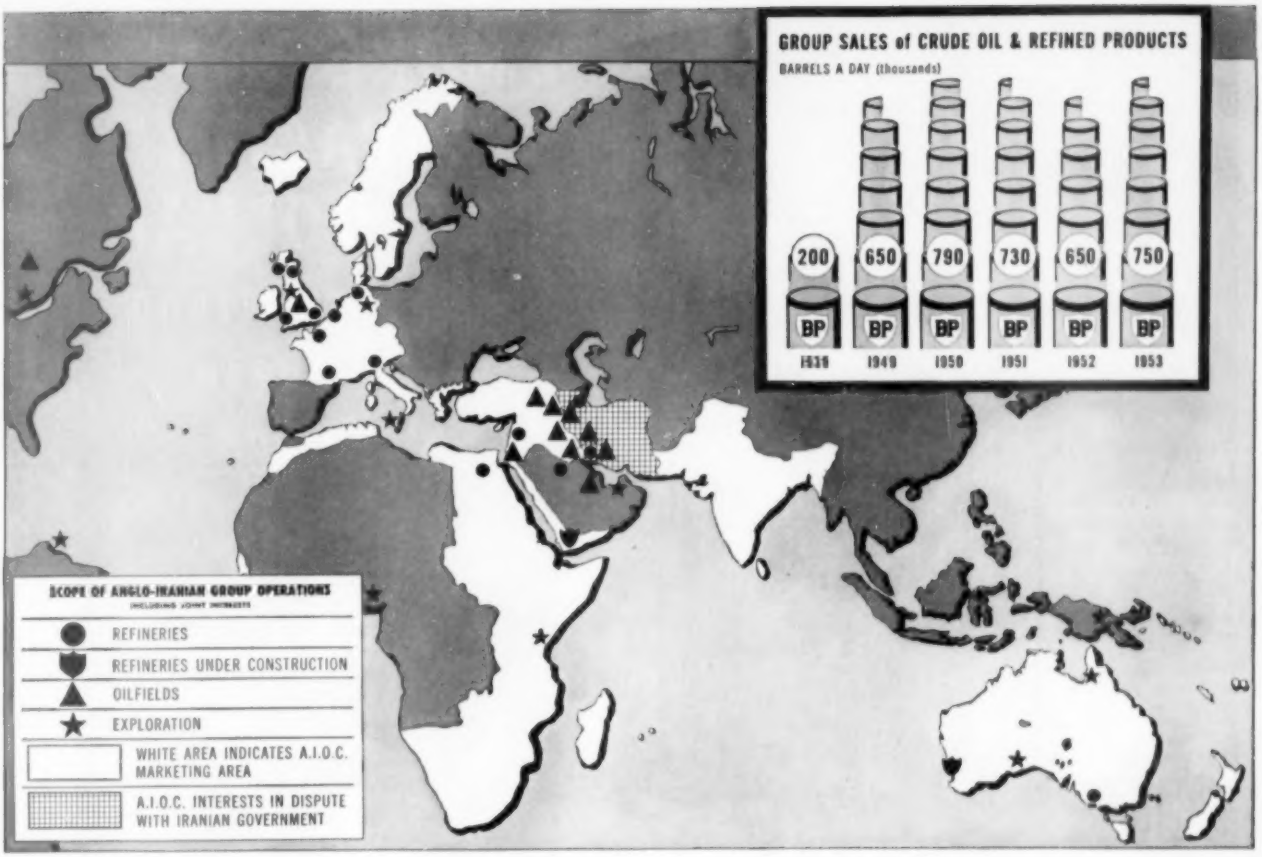


refinery, four months ahead on construction, should come on stream in August and the 60,000 barrel-a-day Kwinana (Australia) refinery early in 1955.

## Exploration

The search for oil continues—in Australia, Canada, Britain, Sicily, Nigeria, Tanganyika, Zanzibar, Trinidad, Papua and the Persian Gulf. Anglo-Iranian has acquired an interest in Triad Oil Company which has well spread holdings in Western Canada. In Papua, a test well at Omati has encountered high pressure gas at 13,743 feet. In Sicily, a test well at Vittoria is below 7,000 feet, with oil indications. Underwater drilling is to be started off Trinidad this year and exploration in the Persian Gulf has begun.

## Tankers

Anglo-Iranian's tanker fleet now totals 142 ships of 1,917,000 deadweight tons, compared to 151 ships of 1,934,000 deadweight tons a year ago. While slightly smaller in number and tonnage, the present fleet can carry a larger total tonnage more economically due to the increased proportion of larger, faster and newer ships. The Company's 28,000 and 32,000 ton tankers are proving particularly efficient as carriers of crude from the Middle East. Under construction or on order are 20 ships totalling 474,000 deadweight tons, including 10 of 32,000 tons. In addition, over 2,000,000 deadweight tons continue on charter.

## Iran

Two sets of negotiations are progressing to settle the oil dispute in Iran—one on the part of a proposed consortium of American, British, Dutch and French oil companies, the other involving the question of compensation to Anglo-Iranian. Pending a satisfactory conclusion, Anglo-Iranian has continued with all necessary legal action to protect its rights in oil cargoes derived from the area of its operations in Iran and exported overseas.

(Barrel figures used are approximate)

## FINANCIAL HIGHLIGHTS

| | 1953 | 1952 |
|---|---|---|
| Gross Consolidated Profit | £63,883,828 | £61,260,584 |
| Depreciation | £20,056,243 | £14,198,946 |
| Profit Before United Kingdom Taxation | £42,931,666 | £47,061,638 |
| Net Profit to AIOC | £24,382,850 | £25,165,966 |
| Dividends | £ 9,629,672* | £ 8,119,359 |

* Including recommended final dividend and cash bonus

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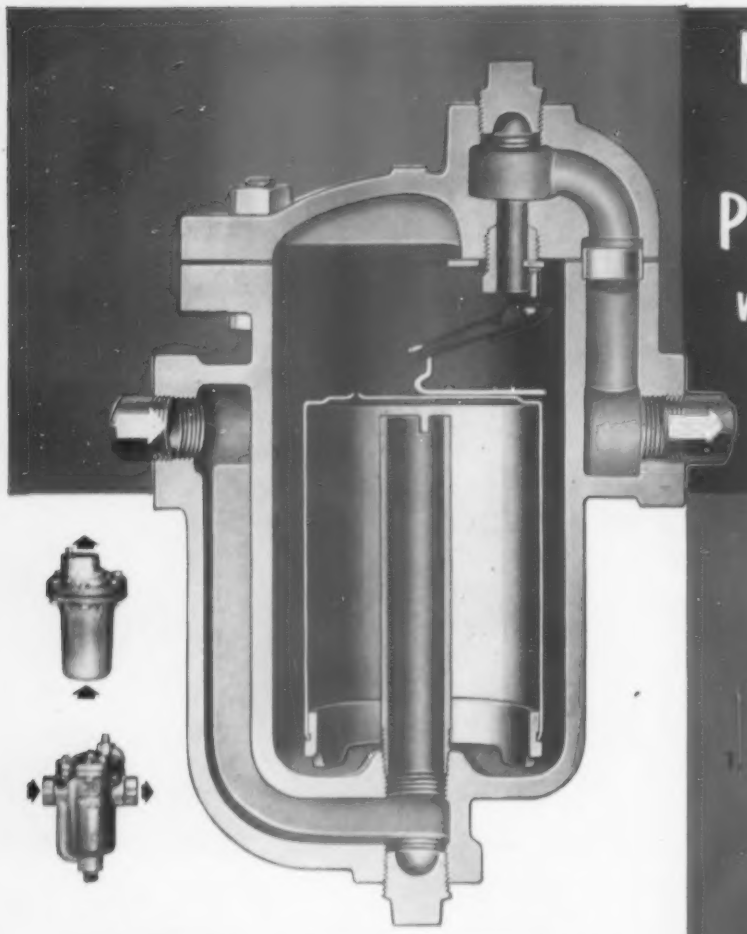
# MORE TRAP CAPACITY PER DOLLAR with Armstrong two-phase leverage





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A single-phase lever can open just as large a valve *or* give just as great valve travel, *but not both.* Thus, Armstrong two-phase leverage gives very much greater capacity, depending on trap size than the earlier leverage system.

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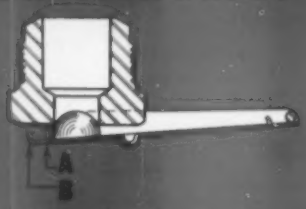
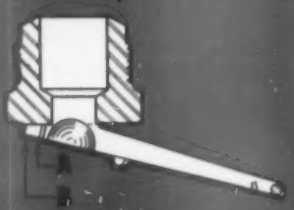



1. Valve in closed position.




2. As the bucket starts to sink, the lever fulcrums at "A", giving high leverage to open the valve against pressure. When valve is well open, the secondary fulcrum "B" touches the face of the valve seat.

3. Additional bucket travel results in fulcrum "B" becoming the pivot, permitting the valve to be opened wider so that restriction to flow of condensate is minimized.

# ARMSTRONG STEAM TRAPS

# Effect of Hole Diameter on Mud Pressures

**by George S. Ormsby**

TO illustrate the effect of hole size, the hole in this case was varied from 11 in. to 17 in. in diameter and the resultant casing-running pressure changes were plotted in Fig. 1. Casing collars are not accounted for, and ordinarily need not be, but if casing is to run in tight holes, collars obviously become an important factor and should be considered. This points to problems in slim-hole drilling and in casing string drilling, and sound engineering practice will be essential to the successful widespread application of either method.

Author is with Phillips Petroleum Co., Houston. This illustration is from a paper presented at A.P.I. Division of Production, Southwestern District meeting, Houston, March 3-5, 1954.

### Preparation and Inspection Before Running Casing*

1. All casing, whether new, used, or reconditioned, should always be handled with protectors in place.

2. Slip elevators are recommended for long strings. Both spider and elevator slips should be clean and sharp and should fit properly. Slips should be extra long for heavy casing strings.

3. If collar-pull elevators are used, the bearing surfaces should be carefully inspected for (1) uneven wear which may produce a side lift on the coupling with danger of jumping it off, and (2) uniform distribution of the load when applied over the bearing face of the coupling.

*From A.P.I. R.P 5CI, Fourth Edition.

4. Spider and elevator slips should be examined and watched to see that all lower together. If they lower unevenly, there is danger of denting the pipe or badly slip-cutting it.

5. Care must be exercised, particularly when running long casing strings, to insure that the slip bushing or bowl is in good condition.

6. The following precautions should be taken in the preparation of casing threads:

a. Immediately before running, remove protectors from both field end and coupling end of a number of lengths on top row and clean threads thoroughly.

b. Inspect threads. Those found to be damaged even slightly should be laid aside, unless some satisfactory means are available for correcting thread damage.

c. When thoroughly dry, apply thread compound over entire thread surface of both internal and external threads and reapply clean protectors on the field ends.

d. On new pipe where the above recommendations are not to be fully observed, it is safer to run casing as received from the mill, with the addition of thread compound.

7. Lower or roll each piece of casing carefully to the walk without dropping. Use rope snubber if necessary.

8. Avoid hitting casing against any part of derrick or other equipment. Provide a hold-back rope at window. For fixed or unmarked strings, a drift or "jack rabbit" should be run through each length of casing when it is picked up from the catwalk and pulled onto the derrick floor, to avoid running a heavier length or one with a lesser inside diameter than called for in the casing string.

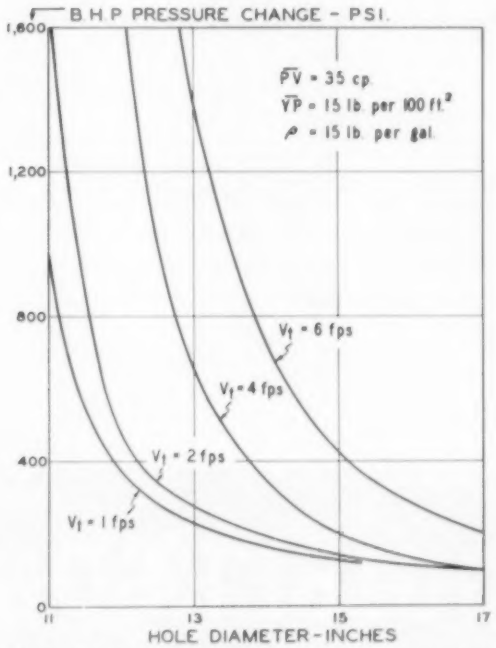



**Fig. 1—Calculated effect of hole diameter on bottom-hole-pressure changes running 10,000 ft. of 9⅝-in. casing at various speeds with conventional float.**

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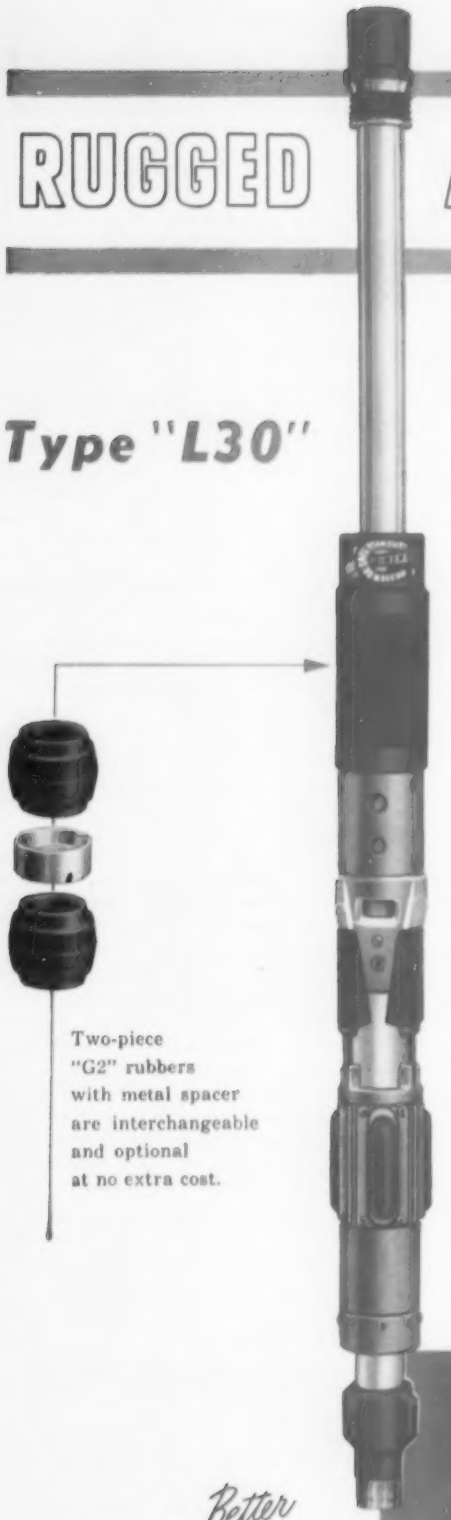
### *Type "L30"*



Two-piece "G2" rubbers with metal spacer are interchangeable and optional at no extra cost.

For deep well work with high temperatures and pressures, use Guiberson's dependable "L30" Packer. It will give you long valve travel (30 inches) with minimum overall length at no extra cost. You can pull the "L30" surely and safely. The fast-action automatic latch, protected by a positive anti-lock device that assures ready release, snaps easily into latched position. Tough, long-wearing friction pads supply ample drag. Packing rubbers of advanced design will not vulcanize to the casing wall. All these features and others too are available on the "L30" in a wide range of casing sizes.

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# Economics of Modern Gas Dehydration—1

by A. H. Weil

THERE are several methods available to accomplish the desired, or required, dehydration of natural gas, the one to be selected depending upon the local conditions and the degree of water-vapor removal which must be accomplished in each instance.

**Some conclusions . . .** As a result of United Gas Pipeline Co. experience it has been concluded that:

1. Diethylene glycol plants, which produce dew-point depressions of from 40°-50° F. will serve to dehydrate gas destined for local markets in southern latitudes.

2. Solid - desiccant - type dehydration plants have a higher installed cost per million cubic feet of capacity and have a higher unit cost of operation; such higher initial and operating costs are justified when it becomes necessary to produce gas to meet sales contract specifications of 7 lb. or less water vapor per million cubic feet of gas.

When the first natural-gas dehydration plant was constructed and placed in operation during the 1930's, economy of the operation was not the primary consideration. Most of the effort was directed to the development of an apparatus that would accomplish the desired end—that is, the removal of free water and water vapor from gas streams at elevated pressures, which became necessary about that time to permit the crosscountry transmission of natural gas.

Dehydration of gas in the beginning was needed only by the owners of the early transmission lines and the first plants were relatively expensive and inefficient affairs.

Within the past 10 to 12 years the sale of gas to the long-lines transmission companies has required that the owner of even a single well meet specifications which permit not more than 7 lb. of water per M.M.c.f. of gas and sometimes even less. This means that there was created a demand for equipment which is within the reach of the smallest operator so that he could get into the market, and the genius of American equipment operators has met this demand and made the equipment available.

Author is with United Gas Pipe Line Co., Shreveport. Paper presented at thirty-third annual N.G.A.A. meeting, Dallas, 1954.

**Early methods . . .** Some of the early methods of gas dehydration employed calcium chloride, lithium chloride, calcium bromide, and other inorganic compounds, most of them costly installations which produced questionable results. The need for improved techniques was ever present and led to the accepted present day methods of dehydrating in plants using:

1. Glycols, either diethylene or triethylene.

2. Solid-type desiccants, such as bauxite, alumina, silica gel, or combinations of these materials.

3. Low - temperature equipment which takes advantage of the refrigeration created by expansion of the gas where adequate pressure is available.

4. Glycol-injection systems.

The final choice as to which method of dehydration is the most economical depends mainly on two factors—the cost factor and the determination of which type of unit will meet the specifications set up for the process.

Some of the specific factors which will determine the type of plant to be employed and which must be taken into consideration in reaching the final decision on the one to be selected are, as follows:

### Glycol Plants

Advantages:

1. Low-pressure drop.
2. Has wide range of operating capacity, i.e., low turn down.
3. May be used in presence of materials that might "poison" dry desiccants.

Disadvantages:

1. Dew - point depression is less than with dry desiccants.
2. Possibility of foaming in the presence of heavier hydrocarbons and extraneous materials.
3. Loses efficiency from excessive water dilution if plant is not properly protected.
4. Not readily portable in larger sizes.
5. Requires more personnel and closer attention to operate.
6. Has more moving parts, requiring more maintenance and attention.
7. Temperature of gas should preferably be below 85° F.
8. Dew-point depression limited in most cases to 60° F. at 1,000 psig.

### Solid Type Plants

Advantages:

1. Temperature of gas may range up to 125° F.
2. Essentially "bone dry" gas (less than 1 lb. per M.M.c.f.) can be produced.
3. Effective dew-point depression over wide range of operating temperatures.
4. Compact.
5. Some additional hydrocarbon recovery over that experienced in glycol dehydration.
6. In some instances, the rated capacity of the plant may be increased by bypassing some wet gas and recombining with the dry stream and remain below the dew point needed or specified.
7. More readily adaptable to skid-mounted construction, which increases portability.
8. Automatic features permit minimum operating and maintenance expense.

Disadvantages:

1. Higher initial investment.
2. Pressure drop is higher than with liquid systems, which increases pressure drop or compressor requirements.
3. Rated capacity declines rapidly with decline in pressure.
4. Where no external cooling is available, the ratio of regenerating gas at flow rates below rated capacity is high, resulting in excessive outlet gas temperatures.

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excellent cyclone and Cottrell efficiency
low bed density needs

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low average particle size
33% below 30 microns
only 8% above 80 microns

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moderate to high linear gas velocities
adequate catalyst recovery

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**(Intermediate)**

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moderate disengaging space
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**Aerocat 75/85**
**(Narrow)**

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narrow cut catalyst
75-85% in 30 to 80 micron range
5-10% below 30 microns
15% above 80 microns

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You will certainly want to consider these grades in connection with your unit requirements. A data sheet will be mailed on request, or you may call on one of our Technical Representatives.

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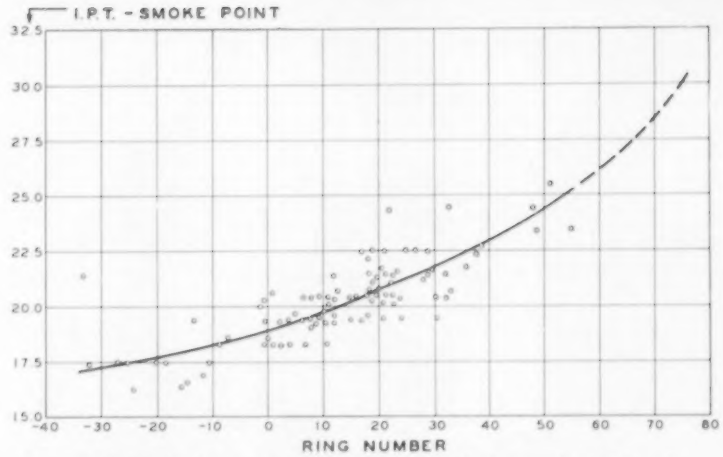
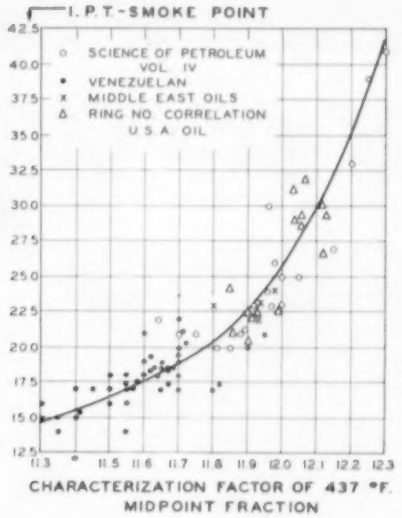



**Fig. 1—Relationship between I.P.T. smoke point and ring number of kerosines.**

**Fig. 2—(Right) Approximate relationship between smoke point and characterization factor of 437° F. midboiling point kerosine fractions.**




# Smoke Point and Ring Number Of Kerosines

**by W. L. Nelson**
Technical Editor

**"Are there relationships between the smoke point of kerosine and other common properties? We are unable to obtain a smoke-point lamp."—G.W.F.**

Several ways of estimating the I.P.T. (Institute of Petroleum Technologists, London) smoke point are available. Characterization factor, ring number (and viscosity), and even A.P.I. gravity are interrelated. The ring number of kerosines is related to Saybolt thermo viscosity and gravity as follows:

$$\text{Ring No.} = \frac{\text{Thermo Vis.}}{5} - 10\,(46\text{-A.P.I.})$$

It is used extensively to estimate smoke point because viscosity measurements are a routine operation in analyzing kerosines and the general relationship is shown in Fig. 1. The relationship between various ways of recording viscosity is given in Table 2.

Smoke point is also related to characterization factor as shown in Fig. 2. It is not much affected by the difference in boiling range encountered in kerosine, but it is much higher for low-boiling stocks such as jet fuels, being 65-70 for Mid-Continent (11.85 characterization factor) fuels.

If it assumed that the above relationships are valid, it is also possible to state smoke point as a function of A.P.I. gravity. All of these relationships are combined in Table 1 for comparison.

**TABLE 1**
**Approximate Smoke Points as a Function of Other Common Tests or Properties for Kerosine Stocks Having a Mid-Boiling Point of 437° F.**

| Char. factor | A.P.I. gravity | Ring number | Smoke point |
|---|---|---|---|
| 11.2 | 32.8 | ..... | 14.1 |
| 11.25 | 33.5 | ..... | 14.4 |
| 11.3 | 34.2 | ..... | 14.7 |
| 11.35 | 35.0 | ..... | 15.1 |
| 11.4 | 35.7 | ..... | 15.6 |
| 11.45 | 36.4 | ..... | 16.0 |
| 11.5 | 37.2 | —45 | 16.5 |
| 11.55 | 37.9 | —34 | 17.0 |
| 11.6 | 38.7 | —24 | 17.5 |
| 11.65 | 39.4 | —14 | 18.1 |
| 11.7 | 40.2 | — 3 | 18.8 |
| 11.75 | 41.0 | 7 | 19.5 |
| 11.8 | 41.8 | 17 | 20.4 |
| 11.85 | 42.5 | 27 | 21.4 |
| 11.9 | 43.3 | 37 | 22.6 |
| 11.95 | 44.1 | 47 | 24.0 |
| 12.0 | 44.8 | 57 | 25.7 |
| 12.05 | 45.6 | 66 | 27.6 |
| 12.1 | 46.4 | 75 | 30.0 |
| 12.15 | 47.2 | 81 | 32.5 |
| 12.2 | 47.9 | ..... | 35.5 |
| 12.25 | 48.7 | ..... | 38.5 |
| 12.3 | 49.0 | ..... | 42.5 |

**TABLE 2**
**Relationship Between Saybolt Thermo Viscosity, Universal Saybolt Viscosity, and Kinematic Viscosity All at 60° F.**

| Saybolt thermo viscosity | Kinematic viscosity | Universal Saybolt viscosity |
|---|---|---|
| 100 | 0.57 | ..... |
| 150 | 0.91 | ..... |
| 200 | 1.25 | ..... |
| 250 | 1.58 | ..... |
| 300 | 1.93 | 32.3 |
| 350 | 2.26 | 33.5 |
| 400 | 2.59 | 34.7 |
| 450 | 2.92 | 35.7 |
| 500 | 3.27 | 36.8 |
| 550 | 3.60 | 37.8 |
| 600 | 3.93 | 38.8 |
| 650 | 4.27 | 39.9 |
| 700 | 4.60 | 41.0 |

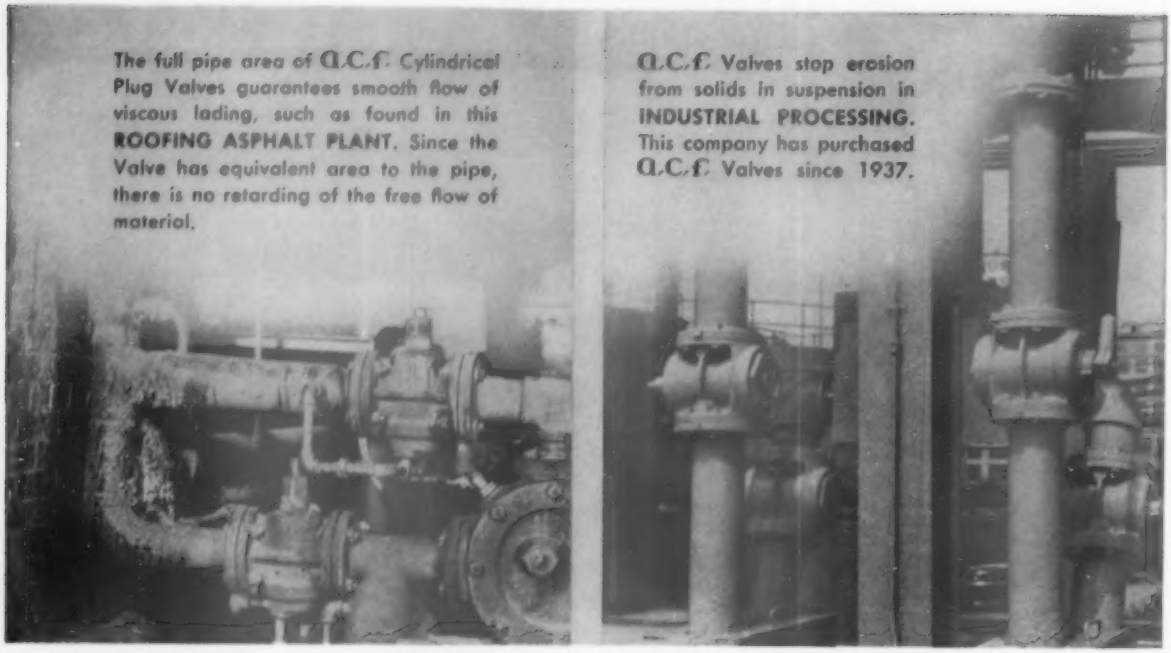
## Saving by Use of High-Pressure Steam

**"We are considering raising our steam pressure from 400 to 600 psi. when we add boilers. What saving can be expected?—R.M.G.**

Obviously, each refinery presents a different situation but in general the saving in fuel is somewhat as follows:

| | |
|---|---|
| 400 changed to 600 psi. | 6.2% |
| 600 changed to 850 psi. | 4.2% |
| 850 changed to 1,200 psi. | 1.0% |

These may appear to be small increases, but inasmuch as steam generation may constitute 5-10 per cent of the total operating cost, the saving represents several thousands of dollars per year for even a small refinery.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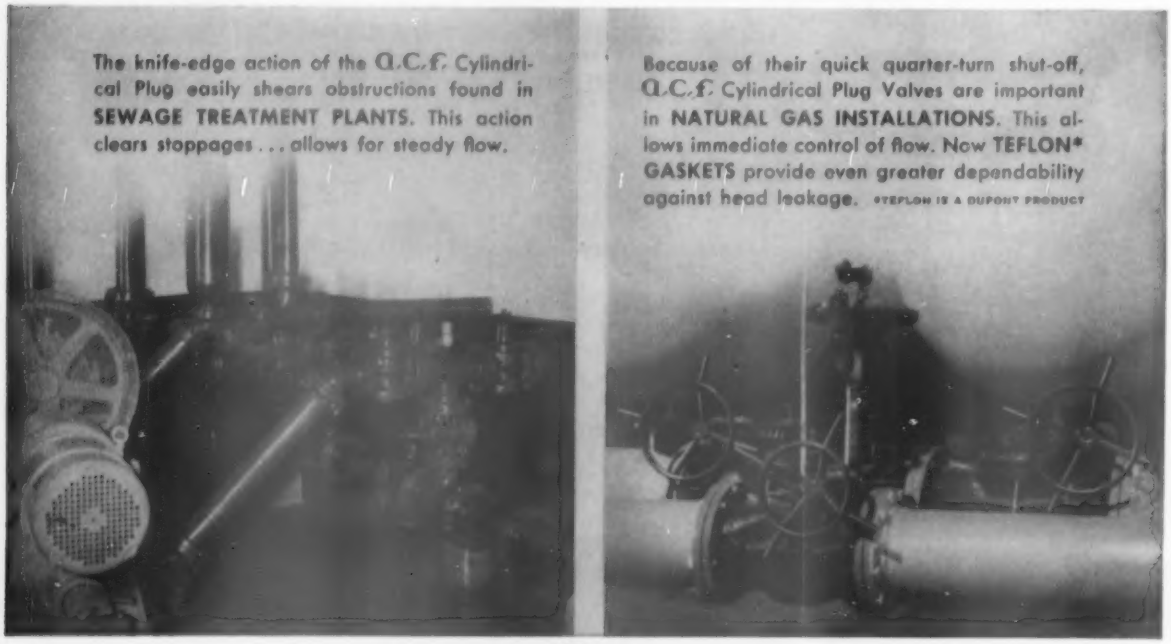
The knife-edge action of the a.c.f. Cylindrical Plug easily shears obstructions found in SEWAGE TREATMENT PLANTS. This action clears stoppages . . . allows for steady flow.
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# The Combustion Gas Turbine in Natural-Gas Transmission—3

by Tracy S. Park, Jr.

IN determining pipeline gas-turbine performance it is necessary to consider the centrifugal gas compressor as an integral part of the system. The gas compressor is the end to which all efforts on the turbine must be directed in order to produce an efficient, workable combination. The pipeline compressor in itself has no cognizance of its driving force, and to that end, it could be powered by a steam turbine, electric motor, or geared through a speed increaser to a reciprocating gas engine. The only impulse it can receive and recognize is speed and torque to its impeller. Moreover, the compressor does not set up its own operating requirements when it is placed on a pipeline. The line has a characteristic, depending on the inside diameter, length, and efficiency. The latter is a function of the inside conditions of the wall and the existence of any obstructions to the flow of gas.

Author is mechanical engineer, Tennessee Gas Transmission Co. Paper presented at N.G.A.A. meeting, Dallas, 1954.

**Reciprocating and centrifugal . . .** Operating characteristics of reciprocating compressors are firmly established and understood. It is fundamental that by means of the manipulation of clearance pockets on the compressors, an engine can deliver its constant rated load over a wide range of compression ratios. Thus, the compressors can deliver a large volume of gas at a low ratio, or a small volume of gas at a high ratio —all at constant load. On the other hand, centrifugal compressors require speed changes to vary the compressor ratio, which in turn varies the horsepower required of the prime mover. It should be interesting to superimpose the characteristics of the two compressors on a pipeline operating curve and note the different manner that the two compressors accomplish this same end.

**Compressor characteristics . . .** Fig. 1 portrays such a picture. Curve A is a plot of the Panhandle equation for flow in a 30-in. pipeline, and assumes a constant discharge pressure of 900 psig. at the plant, and a station spacing of 70 miles. The station 70 miles upstream from the one shown also discharges constantly at 900 psig. With these conditions set, flow in million cubic feet per day is plotted against compression ratio and brake horsepower. As flow is increased, pressure drop along the line is increased, and the suction pressure at the plant is lowered. Hence, with a constant discharge pressure, the compression ratio and brake horsepower increase with flow. Curve A therefore shows required pipeline horsepower and compression ratios for various quantities of flow to meet the conditions as set up. The

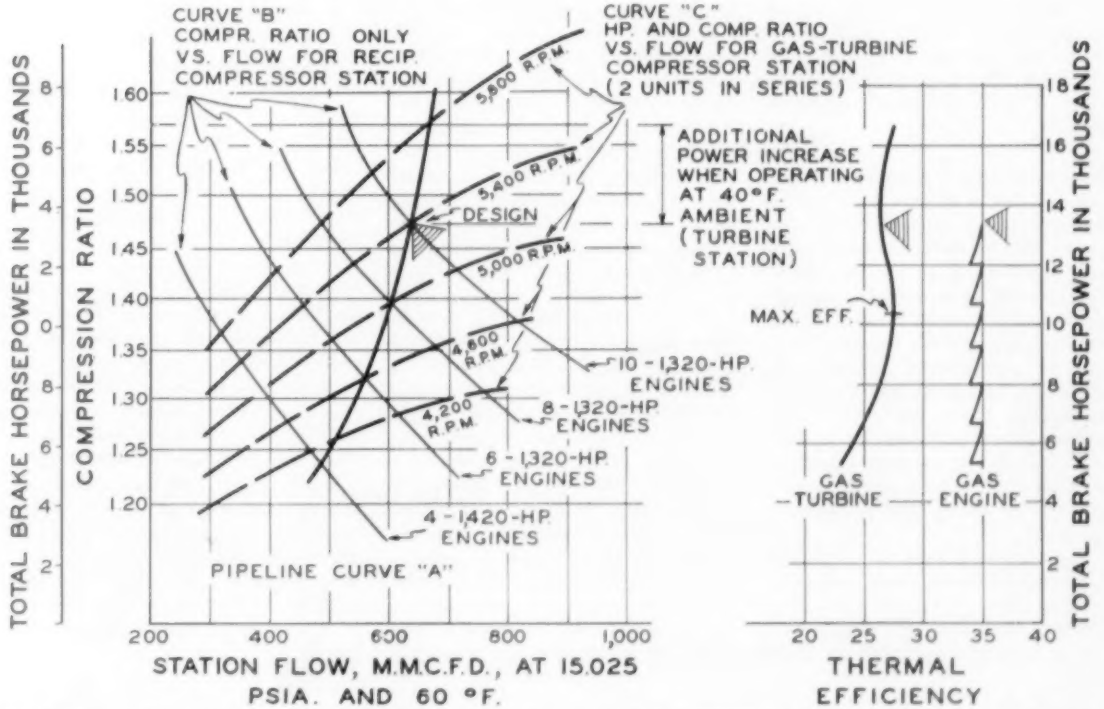



**Fig. 1—Operating comparisons between a two-unit gas-turbine compressor station (13,400 hp.) and a multigas-engine compressor station (13,200 hp.) on a 30-in. pipeline.**

design point of this station, as indicated, is 640 M.M.c.f.d. at a 1.47 compression ratio. This calls for approximately 13,300 installed horsepower.

**Case 1—Reciprocating . . .** To meet design conditions, assume that ten 1,320 hp. compressor engines are installed, or a total of 13,200 hp. Superimposed lines "B" represent compression ratio vs. volume curves at constant horsepower for 10, 8, 6, and 4 engines respectively. The horsepower ordinate does not apply to these curves, except where they intersect the pipeline characteristic "A." If it be desired to reduce flow to 600 M.M.c.f.d., two engines may be shut down, and eight engines will suffice. If flow should further be reduced to 560 M.M.c.f.d., six engines will be required. At 490 M.M.c.f.d., four engines will do the job. At any desired flow between curves "B"—say 540 M.M.c.f.d.—five engines will operate at full load and one at partial load. Load factors less than 100 per cent are therefore obtained by removing engines from service one or more at a time, thereby allowing the remaining engines to operate at full load, with the possibility of one engine operating at partial load. Economically this has proved to be good, since the engines in operation at reduced load factors are loaded and running at maximum efficiency. The gas-engine efficiency curve, Fig. 1, graphically indicates this.

**Case 2—Gas-turbine-driven . . .** Gas turbines similar to those installed on El Paso's system are now rated 6,700 hp. at 80° F. ambient temperature, with 5,400 r.p.m. of the load shaft. To meet the same design conditions stated before, two of these machines will be required with the centrifugal pipeline compressors arranged in series. For any given operating point on pipeline Curve "A," Fig. 1, the compressors run at identical speeds, and each operates at the same compression ratio, which would be the square root of the ratio across both machines.

Superimposed lines "C" represent characteristic horsepower and compression ratio vs. volume curves for various synchronized compressor speeds ranging from 5,800 to 4,200 r.p.m. The 5,400-r.p.m. speed line intersects the pipeline curve at design horsepower and compression ratio. If it be desired to reduce flow to 600 M.M.c.f.d., both machines will be reduced in speed to 5,000 r.p.m. If flow should further be reduced to 560 M.M.c.f.d. 4,600 r.p.m. will be required, and at 510 M.M.c.f.d., 4,200 r.p.m. will suffice. Load factors less than 100 per cent are therefore obtained by reducing the speeds of both machines simultaneously. If a flow corresponding to 6,700 b.hp. is desired, one machine may be removed from the line, and the speed of the remaining machine increased back to 5,400 r.p.m. if desired. This phenomenon, however, is not shown. The gas-turbine-efficiency curve, Fig. 1, graphically illustrates the thermal efficiency variation with load. Note that maximum efficiency of 27.5 per cent occurs at 10,400 hp., or 5,200 hp. per machine. At design load of 6,700 hp. per machine, the efficiency is 26.5 per cent.

For pipeline-overload conditions, gas turbine plants have the advantage that they can produce up to 25 per cent additional power as a result of low ambient temperatures. This increased power is not considered as overload on the turbine, as the design turbine inlet temperature is not exceeded. The above design conditions are specified for an 80° F. ambient temperature. Should this temperature drop to 40° F. (wintertime conditions), the axial flow compressor shaft (operating at constant r.p.m.) will compress a greater volume of the cold, dense air, thus delivering an increased mass flow to the load turbine. Output per turbine increases from 6,700 to 8,400 hp., and the load shaft speed increases from 5,400 to 5,800 r.p.m. Fig. 1 indicates that gas flow can be increased from 640 to 670 M.M.c.f.d. when operating at the lower ambient temperature. Engines enjoy only a slight increase in power due to lower temperatures—about 1 per cent for every 10° reduction in ambient.

Two more installments will follow in this series. In the next installment a plot will be presented of installation cost per horsepower versus total installed horsepower for gas-turbine-driven centrifugal compressor station.

In the final installment of the series operation and maintenance factors will be discussed for gas-turbine-driven centrifugal compressors in pipeline service.

These will include:

1. Fuel rate (based on a fully loaded station).
2. Operating supervision.
3. Operating labor.
4. Lubricants.
5. Auxiliary power requirements.

With regard to water treatment, if gas aftercooling is not employed, the water requirements of both engines and turbines are low. Both operate on a closed water system, and make-up is required only in the amount that is lost by evaporation, through venting, and leaks. Gas turbines circulate approximately 3 gal. per horsepower per hour, while engines require from 16 to 30 gal. per horsepower per hour. For either type of plant not employing gas aftercooling, this expense is so low as to be considered negligible by comparison with the other expenses.

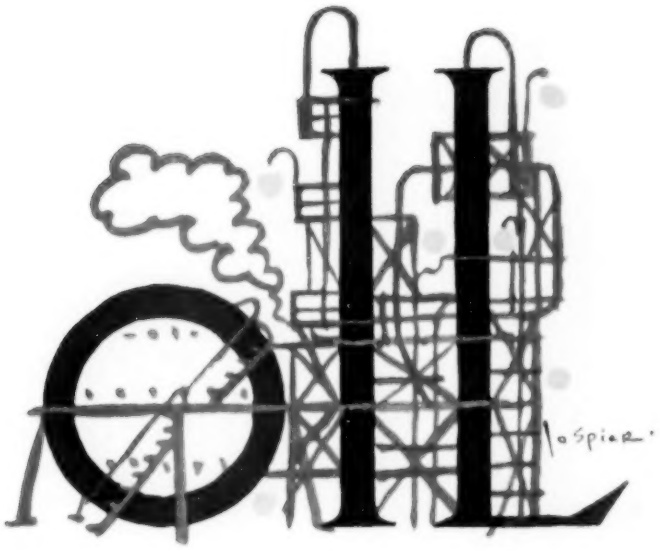
The one large factor in turbine compressor plants which still remains mostly unknown is that of maintenance. Maintenance labor and materials may go into:

1. Buildings and structures.
2. Compressor machinery.
3. Other equipment.

Under "other equipment" would be included gas scrubbers, station piping, etc. This factor of maintenance and the direct costs reported by El Paso Natural Gas Co. will also be discussed in the concluding installment.

Information pertaining to compressor station layout, piping design, description of equipment and control apparatus and operational procedures have been purposely excluded from this series. A number of papers have been published relating to these phases and are available to those desiring to go into more detail.

Each gas-transmission system in this country must have design and operating characteristics of its own, which will depend on location, total sales volume allowable, pipeline pressure ratings, and locations of gas purchase and sales points relative to the system.

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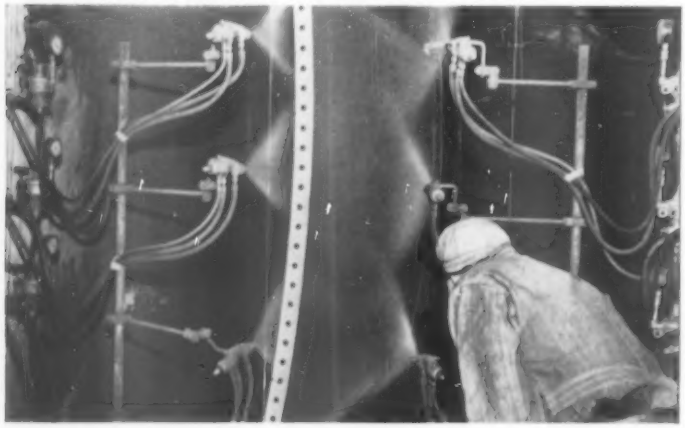

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by R. I. Martin



## ELECTRIC LOGGING—32

# Transition Zones

AS most sands contain some shale it is not surprising that a change in the S.P. log has been found when passing the oil-water contact in a sand. This change is not in itself a positive indication since the same effect may be produced by an increase in the salinity of the water with depth, or a decrease in the percentage of shale in the lower part of the sand. Such a sudden change in water salinity is unlikely within a sand. The resistivity curves should therefore provide an answer. If the upper, low S.P., is accompanied by an increase in resistivity the sand is probably oil bearing, because an increase in clay would not give this resistivity effect.

### Transition Zones

Fig. 1 shows a log with a variable S.P. curve. The sand from 8,970 to 8,990 ft. and the upper part of the sand below 9,010 ft. are thick enough to exhibit the full S.P. effect found at 9,000 and below 9,050 ft. Reasons for the lower S.P. effect may be:

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

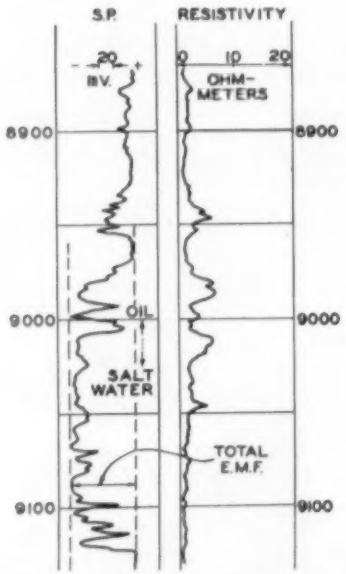


Fig. 1—Field example of a log with a variable S.P. curve.

1. The sands are water bearing and contain sufficient shaly material to explain the reduction of the static S.P.

2. The sands are not only shaly, but also contain gas or oil. In this case the proportion of shaly material necessary is less than in (1).

Inspection of the resistivity curve shows that reason (1) is not likely to apply. Therefore, the sands would be considered to be oil or gas-bearing.

If the contacts between the sand and shale are not sharp, then the S.P. curve may have a different shape from those previously considered. Fig. 2 shows two possible cases. In Case A a thin layer of clean sand of thickness 2 d occurs at a distance of 2 d above the main sand. In contrast, Case C shows an intimate mixture of sand and clay with a thickness of 16 d. In order to avoid too much detail Rt has been taken equal to 101 Rm. Both S.P. curves are compared in B where a new type of inflection point, one of minimum slope occurs at the midpoint of the transition in each case. In addition, the inflection points at the boundaries of the transition may be seen for Case C.

Because of the particular thickness chosen in Case A, the upper boundary of the thin bed is indicated by a normal inflection point, while the lower boundary appears opposite an inflection point of minimum slope.

In some cases the percentage of clay may increase continuously towards the shale. In such cases the pseudo static S.P. itself will decrease continuously from the sand to the shale. The S.P. log would show an almost constant slope with no definite inflection points in this case, because there is no definite lithologic boundary.

**Base-line shift . . .** In many areas a break or offset in the shale base line may be noted, at certain definite stratigraphic depths. Such changes are often useful markers.

This shift is generally caused by a difference in the nature of the shales above and below the level of this offset.

**Base-line drift . . .** Another phenomenon is that of a progressive increase in the value of the shale base with depth. Its occurrence is general enough to have been reported but no satisfactory explanation has been given.

Exceptionally bad cases have been caused by careless manipulation of the recording instruments, but in general, a small increase appears to be a naturally occurring phenomenon in some cases. No practical significance may be attached to it, however, as the change is so gradual, and the sizes of the peaks are measured from this base line.

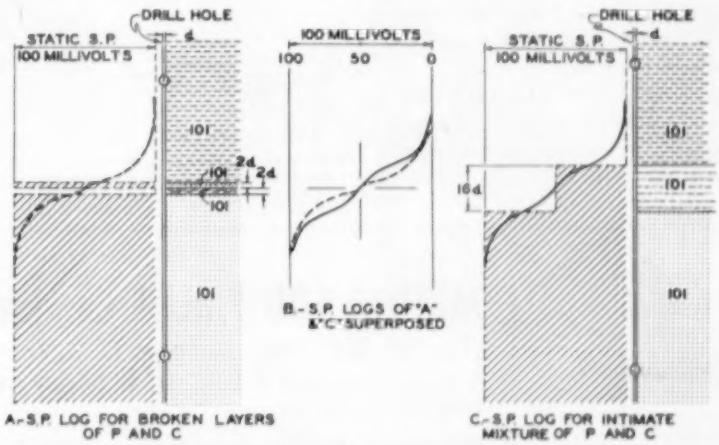


Fig. 2—Two possible cases in shape of S.P. curve for transition zone. Both figures from H. G. Doll, "The S.P. Log: Theoretical Analysis and Principles of Interpretation." A.I.M.E. T.P. 2463, September 1948.

# 2 tested ways to CUT COST

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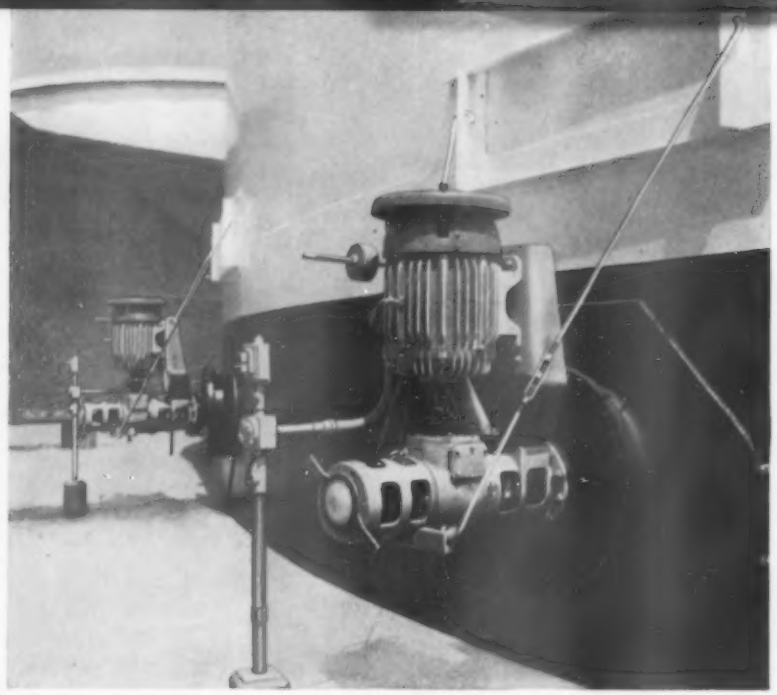

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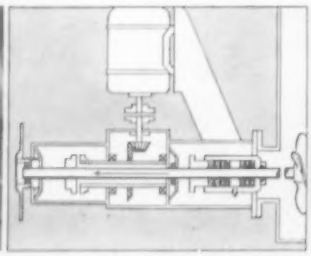
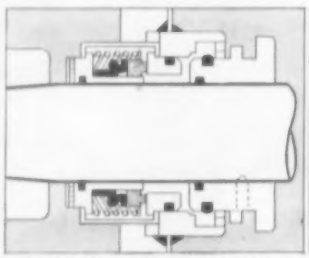
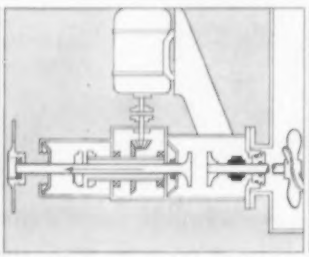


...retracts the mixer shaft outward, like the stem of a valve. Inside the tank...

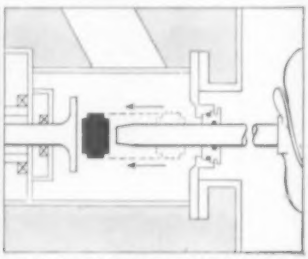
...a Teflon "O" Ring squeezes against the shaft and flange hub, keeping product safely in the tank while you change packing.



**ROTARY SEAL** ends repacking—forever. Seal runs without adjustment for its lifetime. Easy to replace, too...



...Shaft comes apart. Tank end of shaft locks in place and seals liquid safely in the tank...



...Shaft coupling is removed. Seal comes off as a unit. New seal goes on as a unit. In a few minutes, you're back in operation.

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# REFINING

## p-TBBA Produced

### Shell puts new petrochem on stream at Martinez

MARTINEZ, Calif.—Shell Chemical Corp. has announced commercial production of para-tertiary-butylbenzoic acid (p-TBBA) at its new plant here. This new chemical intermediate is made by single step oxidation of hot liquid para tertbutyl toluene over a metallic catalyst.

According to C. W. Humphreys, Shell Chemical's manufacturing vice president, this is the first fully commercial unit to carry out this one-step operation. The process, perfected by Shell Development Co., is said to be adaptable to the production of many monobasic aromatic acids.

Present and most likely uses of p-TBBA are to upgrade vegetable oils by partial replacement, thereby improving drying time, surface hardness, color, color retention, and gloss of alkyd resin paints. Possible further uses include preparation of alcohol and glycol esters for plasticizing polyvinyl chloride, cellulose ethers and esters the manufacture of insecticides, waxes and metal corrosion inhibitors, and preparation of metal salts for grease soaps, thickening agents for hydrocarbons and paints, and stabilizers for vinyl polymers and copolymers.

## Imperial's Regina Plant On Stream After Expansion

REGINA.—Official opening of the recently expanded Regina refinery of Imperial Oil, Ltd., was marked June 1, by Saskatchewan Premier T. C. Douglas and plant superintendent W. O. Longworthy. The 2-year construction program costing $7 million has boosted crude capacity from 20,000 to 22,500 bbl. per day. Biggest item in the program was a 7,500-bbl. per day fluid catalytic cracking unit, of Model IV design by affiliated Standard Oil Development Co. Also added were a vacuum pipe still to increase the yield of cat feed stock, treating, and light ends recovery facilities, a new technical building, and mechanical shops.

Since the refinery was first built in 1916, it has processed more than 20 different crudes, some from as far distant as Texas. To the Leduc and Redwater crudes now charged to stills, the newly modernized refinery will now add Smiley crude from Saskatchewan's first important light crude field discovered by Imperial last September. Fluor Corp. of Canada, Ltd., was awarded the major construction project.

## Sun Completes Plans for Large Houdriflow Cracker

MARCUS HOOK, Pa.—Sun Oil Co. has completed a licensing contract with Houdry Process Corp. for the construction of a 27,000-bbl. per day Houdriflow catalytic cracking unit at its refinery here. This will be the largest unit of its type yet built, and plans provide for the addition of a second twin unit at some future date.

The new unit will incorporate some new design features. The structure will be simplified by superimposing the lift disengager on the reactor-kiln vessel, and over-all height of the unit will be reduced by a vertical seal leg. Charge to the new unit will comprise tar separator overhead and a vacuum gas oil, with moderate recycle ratios. The catalyst circulation rate will average 700 tons per hour. The kiln has a coke burning capacity of 16,000 lb. per hour.

Catalytic Construction Co. will build the new unit, with completion expected early next year. It will replace some of Marcus Hook's original, 17-year-old Houdry fixed-bed units and will boost gasoline yield of the 160,000-bbl. per stream day refinery.

## Phillips Makes Billionth Gallon of HF Alkylate

BARTLESVILLE, Okla. — Phillips Petroleum Co. has produced its billionth gallon of hydrofluoric acid (HF) alkylate, enough to make four billion gallons of 100-octane aviation gasoline.

The record began Christmas eve 1942 when Phillips put the first HF alkylation unit on stream at its Phillips, Tex., refinery. Within 2 years more than 30 HF plants were placed in operation with Phillips' technical help to supply the wartime demand for aviation fuel.

## Houdriformer Work Begun

HOUSTON.—Construction has begun on a 5,000-bbl. per day Houdriformer at Crown Central Petroleum Corp.'s refinery near here. The new unit is scheduled for completion about October 1. Blaw-Knox Co. has the


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contract for construction of the catalytic reformer at the 25,000-bbl. per day refinery.

## Pan Am Raises Capacity Of New Eastern Refinery

NEW YORK.—Pan American Refining Corp. has decided to increase the capacity of its planned Yorktown, Va., refinery from the original 25,000, to 35,000 bbl. per day.

This change in plans was revealed by Mark C. Hopkins, manager of the new refinery, shortly after a contract was let for clearing the 1,200-acre site in Goodwin Neck, York County.

Site will be cleared by the end of this year, when the company expects to let the general construction contract. The original certificate of necessity on this refinery approved rapid amortization for 65 per cent of $11,512,000; 45 per cent of $12,640,000; and 15 per cent of $1,000,000. The plant will be designed for fuels manufacture and will incorporate catalytic cracking and alkylation facilities.

## Stancal to Build Cracker At Salt Lake Refinery

SALT LAKE CITY.—Standard Oil Co. of California will add a 8,000-bbl. per day catalytic cracking unit at the refinery of its subsidiary, Salt Lake City Refining Co.

The parent company announced that the $2,500,000 addition had been awarded to the Flour Corp. of Los Angeles and that construction would begin within the next few weeks.

When the cracker is completed in April, 1955, it will mark more than $50,000,000 that Standard has spent sinc 1948 for the refining company and its sister company, Salt Lake Pipe Line Co.

# Refining Briefs

**BROOKLYN.—Socony-Vacuum Oil** Co.'s Laboratories Technical Service Department recently analyzed its millionth sample. Organized in 1914 with six men in a single room, the department now utilizes five buildings and has a payroll of 221 employes.

**NEW YORK. — Cities Service Oil** Co. has announced a new motor oil, 5-D Koolmotor, that covers all SAE classifications from 10W to 30. The company says its research shows the oil resists thinning in summer and thickening in winter.


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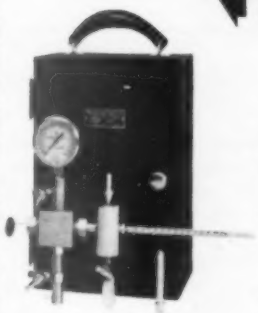
BUREAU OF MINES TYPE

*for testing gases under pressure.*

*Records dew point of gases under pressure.*



- **PRECISION DETERMINATIONS:** Bureau of mines tests show that with manipulation dew points can be duplicated to within 0.2°F.
- **ACCURACY:** Averaging test measurements, the Bureau of Mines reported less than 0.2°F. Dew point temperature difference compared to known standards.
- **SAFETY:** Hydrostatic tests show a maximum working pressure of 3,000 psi. Adjustable mirror allows for safe visual observation into the pressure body.
- **SUITABILITY:** For use with gases under pressure, at pressures from atmospheric to 3,000 psi.
- **CONTINUOUS RECORD:** of dew point gas
- **RAPID RESPONSE:** To changing dew point of gas
- **RELIABLE RESULTS:** Obtained to allow for the control of dew point of natural gas in long distance high-pressure transmission lines.

This instrument records dew point of a continuous sample of natural gas at line pressure up to 1,500 psi.

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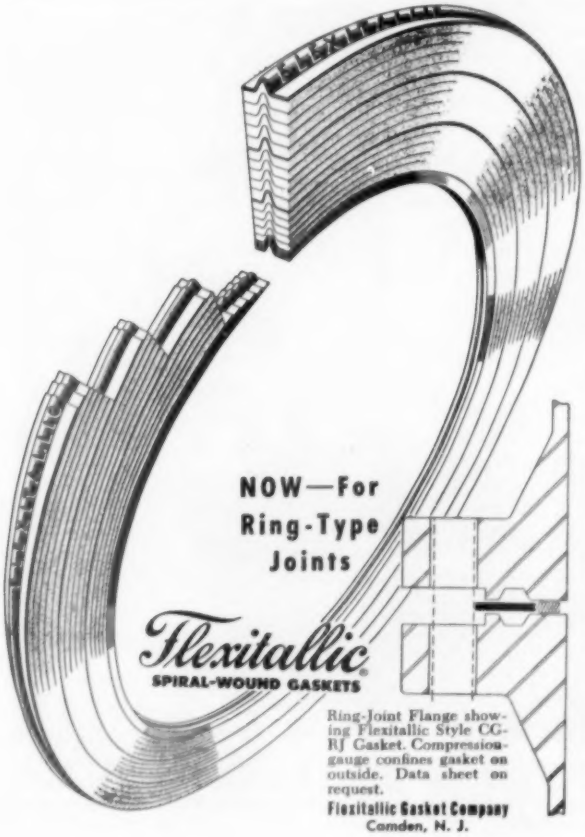

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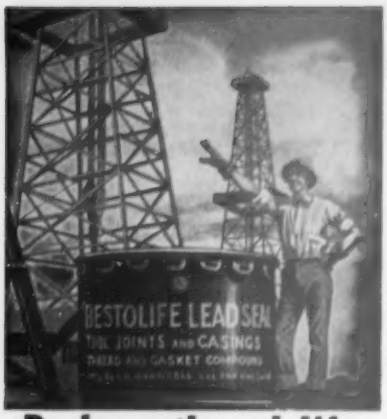


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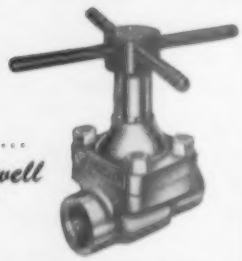

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# Among the Drilling Contractors

**Petroleum Drilling Co.** has a new 9,000-ft. test under way at Anse La Butte, in St. Martin Parish, Coastal Louisiana, where it is drilling for R. L. Daniels, of Houston. The new operation is 1 Rogers estate, in 72-9s-5e.

**Bob Falley** is contractor on a wildcat test Charles Katz and J. B. Moore, of San Antonio, are drilling at 1 Turner, in the George Page Survey, 2 miles south of Burnell, in Bee County, South Texas.

**Milton Crow, Inc.,** Shreveport, is under contract for a 6,000-ft. Smackover test to be drilled for Ashland Oil & Refining Co. in southwestern Nevada County, southwestern Arkansas. Location is 3½ miles southwest of Bodcaw, in 24-14s-23w. Name of the test is 1 Pelt. In addition to the contract, Crow has an interest in the venture.

**Ted LeVieux** is contractor on a new Atoka test Arkansas Western Gas Co. is starting about a mile west of gas production in Watalulu field, in Franklin County, northwestern Arkansas. The test, 1 Bowles, is being drilled with cable tools. It is scheduled for 4,000 ft.

**Mustang Drilling Co.,** Tyler, Tex., has a rig working for J. B. Meeker and associates at a wildcat location 5 miles southwest of Elkhart, Anderson County, East Texas. Objective is the Woodbine, expected around 5,700 ft. The test is 1 Warren, in the D. Crist Survey.

**L. C. Peters** is drilling on an Humble Oil & Refining Co. wildcat test, 1 Gehrels, 11 miles southeast of Fairfield, in Freestone County, East Texas.

**W. B. Hinton** has a new wildcat operation under way in the Richard Miller Survey, Hopkins County, northeastern Texas, where he is contracting for Vernon Whiteley Drilling Co. Location is 9 miles north of Sulphur Springs, at 1 Herman et al.

**Trant Drilling Co.,** Oklahoma City, has taken on a well-deepening job for Humble Oil & Refining Co. in the Flag Lake area, 8 miles northwest of Kerens, in Navarro County, East Central Texas. The contract involves approximately 4,000 ft. of new hole, deepening an old 6,385-ft. test, 1 Tramel, to the Smackover horizon around 11,000 ft.

**Longhorn Drilling Corp.,** San Antonio and Three Rivers, Tex., has a contract for a 10,000-ft. wildcat test to be drilled for Jake L. Hamon, of Dallas, at 1-B J. F. Odem, in the West Nueces Bay area, in San Patricio County, South Texas. It also has contracted for a 7,500-ft. semi-wildcat test to be drilled for Edwin W. Pauley, of Los Angeles, at 1 Isaac Hirsch, in the Hirsch gas area, Webb County, Southwest Texas.

**F. A. York (right), partner with L. A. Miller and William F. Patton in the drilling contracting firm of Miller & York, Bakersfield, Calif., chats with Keith Southwick, superintendent of General Production Service, at the latter company's Bakersfield yard. York also is a coowner of the production service company.**

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**K. L. Kellogg & Sons,** Compton, Calif., is drilling on a deep wildcat test in the Sand Hills area, 20 miles south of Bakersfield, in Kern County, California. It is a contract job for General Petroleum Co., and is designated as 16-3 S. P.-Tejon. Location, in 3-11-19, is 4½ miles north of Tejon field, nearest production.

**Western Service Drilling Co., Inc.,** Longview, Tex., is under contract to Blackwood & Nichols for a deep wildcat test 10 miles north of Lovington, in Lea County, New Mexico. Location, in 24-14s-35e, is for 1 Woodward. Hole is projected to 14,500 ft.

**Kerr-McGee Oil Industries, Inc.,** Oklahoma City, has a contract with Sun Oil Co., for a 9,500-ft. test to be drilled in Breton Sound, offshore from St. Bernard Parish, Louisiana. Location is on Louisiana State Lease 2424, in Block 15.

**Petroleum Drilling Co.** has a new contract operation under way for R. L. Daniels, Houston independent operator, on the east side of Anse La Butte field, in St. Martin Parish, Louisiana Gulf Coast. It is a projected 9,000-ft. test at 1 Rogers estate, in 72-9s-5e.

**West Central Drilling Co.,** Abilene, Tex., is the contractor on Sid Katz Exploration Co.'s and White Eagle Oil Co.'s new Cambrian exploratory test 3½ miles southwest of Blackwell, in Coke County, West Central Texas. The test is listed as 1 Copeland, with location in Section 381, Block 1-A, H&TC Survey. Contract is for 7,000 ft.

**Otis Russell Drilling Co.,** Houston, has a rig working for Trull & Thompson, also of Houston, on a projected 6,500-ft. wildcat test, 1 Ryman, in the E. R. Wightman League, 2 miles northeast of Matagorda, in southern Matagorda County, Texas Gulf Coast.

**Southern Six Drilling Co.** has taken on a contract for a 10,000-ft. offshore test to be drilled for Atlantic Refining Co., in Main Pass area, off the coast of Plaquemines Parish, Louisiana. Location is on State Lease 2361, in Block 13.

**A. W. Williams Inspection Co.,** Mobile, Ala., is under contract with A. R. Temple, independent operator, Biloxi, Miss., for a Lower Cretaceous test to be drilled 15 miles southwest of Blountstown, in Calhoun County, northern Florida. The test, 1 International, in 16-2s-10w, is scheduled to go to 5,000 ft., or 100 ft. in the Lower Cretaceous.


Bos-co

FRICTION TYPE

STARTER

FOR HORIZONTAL ENGINES

ASK THE MAN WHO OWNS ONE

• Proven Performance • Safer
• More Compact and Economical
• Easier to Operate

Rubber covered pulley gives long wear, positive engagement.

Reduction gear eliminates jack shaft. V-belt drive and guard.

Available At Your Supply Store.

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EQUIP'T ENG'R'G & MF'G.

526 South Boulder Ave., Tulsa, Oklahoma

SAFETY

WHEEL WRENCH

by Baird

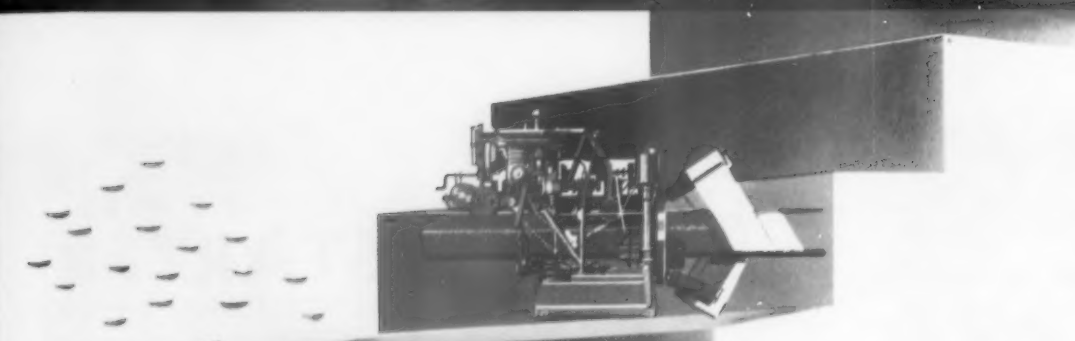
Will fit rods from ½" to 1¼". The jaws are hardened.

For safety reasons, be sure to use hub bolt for sanded up jobs.

*Always available through your supply store.*

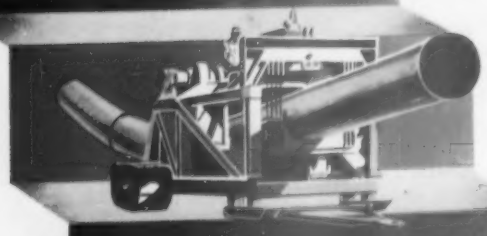
BAIRD MFG. CO.

P. O. Box 380 TULSA, OKLA.



C-R-C TRAVELING TYPE COATING AND WRAPPING MACHINES—COAT AND WRAP 2" THROUGH 36" PIPE LINES.

C-R-C DOPE KETTLES—SWEEP AND PROPELLER AGITATION TYPES 17 TO 30 BARREL CAPACITY.



C-R-C VERTICAL BENDING MACHINE—VERTICAL BEND FOR ACCURATE MEASUREMENT FROM 10" THROUGH 36" PIPE SIZES.

C-R-C DITCHING MACHINES—MIDDLE INCHER AND BIG INCHER—DITCH TO 52" WIDE WITH A DEPTH CUT OF 8'6".

# step by step...

# all the way

C-R-C, the first name in pipe line equipment, has been the pipeliner's main supplier in some of the most difficult lines in the world. The choice of C-R-C for the tough ones, and the choice of C-R-C equipment by the leading pipeline contractors prove that the men at C-R-C know pipelining and build equipment pipeliners like.

Take advantage of the complete responsibility of one manufacturer that comes when you have an all C-R-C spread. A spread designed for pipeliners by men who know what's needed on the job.

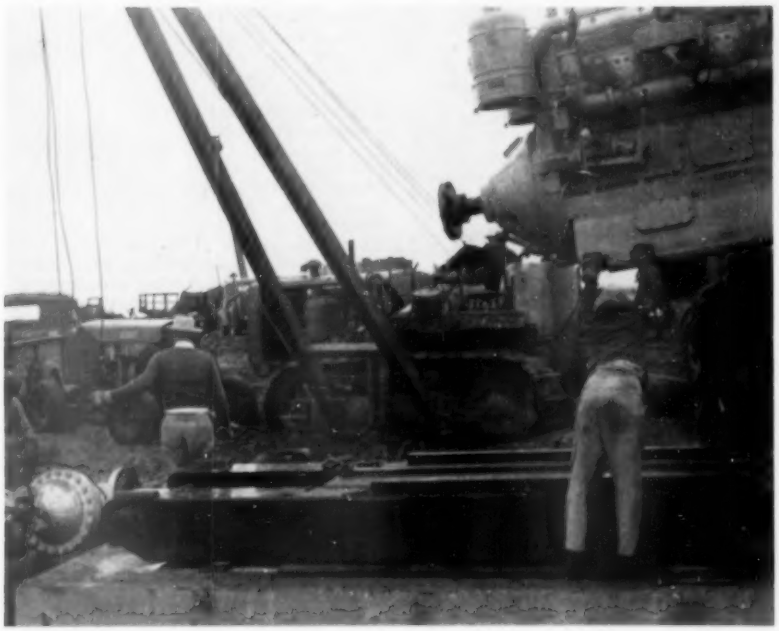
C R C

**CRUTCHER • ROLFS • CUMMINGS, INC.**

*C-R-C has been First with every major development in pipeline equipment*

# Pipeline Patrol

*. . . Report on Construction*



**One of two pumping units being installed for Aramco near Dhahran, Saudi Arabia. For operation at an ambient temperature of 130° F., large radiators and fans capable of delivering 25,700 cu. ft. per minute were installed on the engines.**

## Engine pump units flown to Saudi Arabia

DUE to a sudden increase in crude-oil demand, Arabian American Oil Co. recently had to make a rapid increase in pipeline capacity. Arrangements were hastily made for installing two additional pumps on the 1,200-mile pipeline that stretches across the Arabian Desert to the Mediterranean.

An urgent call to a manufacturer in the United States started two pumping units, which Aramco had on order, on an airborne trip to Arabia. Fitted with special attachments for desert use and weighing over 40,000 lb. each, these units were flown by DC6 transports of KLM Dutch Airline to Dhahran, Saudi Arabia. The engines were disassembled and four planes participated in the flight.

Within 2 weeks from the time they left the factory the engines, rated at 375 hp., continuous, at 1,200 r.p.m., were pumping oil at a rate of 30,000 bbl. per day. Their installation raised the total output of Aramco to approximately 1,000,000 bbl. per day.

Attachments to the engines include 5-kw. generators, electronic control panels, and large radiators and fans. The latter allow the engines to operate continuously in an ambient temperature of 130° F.

## Under Way, Contracted, and Planned . . .

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the job.

### Crude-Oil Pipelines

• **Atlantic Pipe Line Co.**—Planning 40-mile, 8-in., looping of present crude line from Andrews to Midland, Tex.

• **California - Oregon Pipe Line System**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

• **Cities Service Pipe Line Co.**—60 miles, 12-in., Sour Lake, Tex., to Houston, Tex.


See Composite and Refinery Catalogs, or Write for Folder On

FLEET-LINE®

PIPE SADDLES AND REDUCERS

Nozzle sizes from 1/4" to 24" — ASTM A234

Also for pressure vessel heads

Nominal pipe sizes 1" to 30" — Special sizes, lengths, schedules

ASA B16.9 ASTM A234 — Eccentric

Immediate Delivery

STEEL FORGINGS, Inc.

P. O. Box 2768 • Shreveport, La.

Foot of Fannin Street

NEW! Write for Bulletin. Patented

PIPELINE VENTS AND MARKERS

FLEET-LINE CO.

P. O. BOX 2768

SHREVEPORT, LOUISIANA

S. E. HUEY & CO.

ENGINEERS & SURVEYORS

Heninger Bldg.

Monroe, La.

SURVEYING & MAPPING

PIPE LINE SURVEYS




(For more data on advertised products, use our "Time Saver" yellow cards in this issue)

**CLEANER PIPELINES CO.**

**1900 Armour Rd. No. K. C. 16, Mo.**

**EFFICIENT** cleaning pays off in increased gas volume.

**INTERNAL PIPELINE CLEANING EQUIPMENT:**

EXPANSIBLE CLEANERS
SPRING LOADED CLEANERS
FLEXIBLE SPIRAL BRUSHES
SQUEEGES

**PIPELINE ACCESSORIES:**

NIGHT CAPS
TIPTON PIPE CLAMPS
PIPE HOOKS AND TONGS
O.D. WINDMASTERS
TIPTON HI-PR PATCHES
BEVELING MACHINES
PIPESHINER BRUSHES
PIPE DOLLYS
RUBBER SCRAPER CUPS

**ALL ITEMS IN STOCK**

**(WRITE FOR CATALOG)**

**For Your Protection . . .**

**TAPECOAT®**

***is serviced by the men who sell it***

The service behind TAPECOAT is as distinctive as this coal tar coating in tape form. The sales engineer who sells the job also services it personally. That's why you can specify TAPECOAT with confidence and know that you are getting lasting protection for pipe, pipe joints, tanks and other vulnerable steel surfaces above or below ground. Sizes: Rolls of 2", 3", 4", 6", 18" and 24" widths. Easy to apply. Dependable since 1941 in cutting maintenance and replacement costs. Write for details and prices.

***The* TAPECOAT *Company***

**Originators of Coal Tar Tape Protection**

1539 Lyons Street, Evanston, Illinois

## Pipeline Patrol

O. R. Burden Const. Co. Completion set for June 1954.

**Interstate Oil Pipe Line Co.**—Bids asked for construction of 25 miles of 12 and 8-in. line from Little Lake oil field in Jefferson Parish, Louisiana, to Grand Isle on the Gulf of Mexico.

• **Magnolia Pipe Line Co.**—208-mile, 20-in. crude line under way from Corsicana to Magnolia's refinery at Beaumont, Tex. H. B. Zachry, Const.

• **NNCW Pipeline Co.**—127-mile line, proposed, from Weston County, Wyoming to Casper. 108 miles of 10-in. and 19 miles of 8-in. Est. Cost: $3,500,000.

• **Orchard Pipe Line Co.**—45-miles, 8-in., proposed to transport crude from Masters field in Logan County, Colorado, to point 4 miles northwest of Orchard. Estimated cost: $811,250.

• **Pawnee Pipe Line Co.**—35 miles of 10, 8, and 6-in. line approved from Adena field in Colorado to Merino, Colo.

• **Progress Pacific Pipeline Co.**—1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles, Harbor, Calif.

• **Roosevelt Oil & Refining Corp.**—22 miles, 4 and 6-in., planned St. Helen to Norwich, Mich.

• **Sinclair Pipe Line Co.**—20 miles, 12-16-in., planned, Monee to Blue Island, Ill. 16-in. completed. 14 miles of 12-in. awarded to Morrison Const. Co. Est. completion July.

**Trans Mountain Oil Pipe Line Co.**—Company has awarded contract to Engineers Limited Pipeline Co. to build 15 miles of 20-in. and 11 miles of 16-in. line. Both lines run from Sumas, B. C., to General Petroleum's refinery which is being built at Ferndale, Wash.

• **Union Oil Co. of California.**—Planning construction of a 60-mile crude line from its Clara Valley field to its Wilmington refinery. Line is expected to be completed by late this year. Size not yet determined. Engineering work under way.

• **West Coast Pipeline Co.**—960 miles, 24-26-in., planned. Wink, Tex., to Norwalk, Calif. $106,000,000.

### Products Pipelines

**American Pipe Line Co.**—Line planned from Gulf Coast area to New York City area.

**Badger Pipe Line Co.**—195 miles, 10-12-in., July '54, East Chicago, Ind., to Madison, Wis. (Joint project of Cities Service Oil Co., Sinclair Pipe Line Co., Pure Oil Co., and The Texas C.).

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

**Great Lakes Pipe Line Co.**—Under way extension 130 miles, 8-in., Nebraska City to Grand Island, Neb. R. H. Fulton Const. Co.

127 miles, 8-in., to run from Iowa City, Iowa, to Prophetstown, Ill., and to tie in to the Badger system there. M. R. Co. and Mid-States Construct. Co.

• 189 miles of 12-in. to run from Kansas City to Des Moines.

• 98 miles of 12-in. from Rosemount to Willmar, Minn.

• 63 miles of 12-in. from Willmar to Alexandria, Minn.

105 miles of 8-in. from Alexandria to Fargo, N. D. R. H. Fulton & Co.

**Harbor Products System.**—86 miles of 16-in. underway from Woodbury Junction to Tremley Point, N. J. Pipeline Construction & Drilling Co. is doing the work and completion is not definite because of right-of-way difficulties.

• **International Pipe Line, Inc.**—132 miles, 8-in., proposed, Wrenshall to Minneapolis, Minn.

• **Oil Basin Pipeline Co.**—230-mile, 8-in. products line planned from Laurel, Mont., through Billings to Glendive, Mont. Construction tentatively set to start as soon as weather permits with completion set for late summer. Est. cost: $5,350,000.

**Oklahoma Mississippi River Products Line, Inc.**—475 miles, 10 and 12-in., under way, Duncan, Okla., to West Memphis, Ark. Ford, Bacon & Davis Const. Corp.

**Under way, White River to Allen, Okla.** River Const Co. Completion date 6-15-54.

**Under way, Allen to Duncan, Okla.** River Constr. Corp. Completed.

**Phillips Pipe Line Co.**—71 miles of 8-in. now out for bids. Company expects line to be completed in September.

**Shell Pipe Line Corp.**—65 miles of 12-in. products line from Baton Rouge, La., to Shell's Norco refinery. Houston Contracting Co. has contract. H. T. Muckley, Supt.

**U. S. Gov't. Alaskan Products Pipe Line.—600 miles, 8-in., under way, Haines northward through British Columbia and Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Const. Co. Completion date 9-55.**

**Wyoming-Nebraska Pipeline Co.**—H. C. Price has general contract to build 220 miles of 6-in. line from Frontier Oil Co.'s refinery at Cheyenne to North Platte, Nebraska. Work expected to be completed by October 1954.

**Yellowstone Pipe Line Co.—(Continental Oil Co., Interstate Oil Pipe Line Co., Union Oil Co., and H. Earl Clack interest) 531 miles, 10-in., under way, Billings, Mont., to Spokane, Wash. 9-54. Est. cost: $20,500,000.**

**Billings to Bozeman, Mont. Ross and Powers. Comp. 133 miles, 8-31-54.**

**Bozeman to Helena and on to Clinton, Mont. Associated Pipe Line Contractors, Inc. Completed. 94 miles 6-15-54.**

**Clinton to Perma, Mont. Associated Pipe Line Contractors, Inc. 69 miles 8-31-54.**

**Clinton to Perma, Mont. Eastern Pipe Line Fields Service Co. 76 miles. Completed.**

**Perma, Mont., to Murray, Idaho. Eastern Pipe Line Field Service Co. 74 miles 7-1-54.**

**Murray, Idaho to Spokane, Wash. Engrs. Limited Pipe Line Co. 85 miles 7-1-54.**

### Natural-Gas Pipelines

• **American-Louisiana Pipe Line Co.—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Louisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000.**

• **Arkansas Louisiana Gas Co.**—108 miles of new line proposed, to be added to present system in Arkansas, Louisiana, and Texas. Estimated cost: $9,245,166.

• **Atlantic Seaboard and Virginia Gas Transmission.**—116 miles, 26-in., proposed, loops along Cobb, W. Va., to near Baltimore, Md. Started May 1.

• **Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.**

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

**Chicago District Pipe Line Co.—19 miles of 36 and 30-in., completed of 35 miles planned. Remainder, all 30-in., will be completed in 1954.**

• **Cities Service Gas Co.**—24 miles of 26-in. proposed, to replace two existing 16-in. lines in Franklin and Johnson counties, Kansas.

Nine miles of 20-in. to replace existing 16-in. line in Cherokee and Jasper counties, Missouri.

## Pipeline Patrol

• **City of Dalton, Ga.**—Proposes to build 39 miles of 8-in. from a point of interconnection with Southern Natural's Rome-Calhoun transmission line. Estimated cost: $2,940,000.

• **City of Fayette, Ala.**—20 miles, 5-in., FPC approved, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Alabama. Completion set for early 1955.

**City of Dallas, Ga.**—56 miles of 8 and 4½-in., distribution system. Engineering & Const. Co. Completion June 1954.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., proposed, Green River, Wyo., to Denver, Colo. 1954.

49 miles, 20-in., under way, Morton County, Kansas, to near Hooker, Okla. Estimated cost: $3,999,000. R. H. Fulton Const. Co.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose, Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Dixie Pipe Line Co.**—Proposed 20-mile, 8-in., line from Gwinville field to connection with Transcontinental Gas Pipe Line Corp.'s existing transmission line in Jefferson Davis County, Mississippi. Est. cost: $425,000.

• **El Paso Natural Gas Co.**—20 miles of 10¾-in. proposed from Warren Petroleum Corp.'s Saunders plant in Lea County, New Mexico, to connection with El Paso's existing 30-in. line in Lea County.

• **Fort Worth Basin Gas Co.**—Planned Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

**Gulf Interstate Gas Co.**—860 miles, 30-in. under way. Acadia Parish, La., to Boyd County, Ky. H. C. Price and Houston Contracting. 11-54.

Houston Contracting Co., Ltd., has completed 370 miles of its 500-mile contract from Rayne, La., to Kinkade, Tenn. Three spreads which have been working on the job are presently overhauling equipment and will not resume work until spring. Spread 1, headed by E. C. Norris, has completed 165 miles from the Mississippi River northward and it will resume work this spring.

Spread 2, headed by F. A. Silar, has completed 117 miles from the Ouachita River southward into the inception point of Rayne.

Spread 3, headed by M. L. Thompson, has completed 88 miles from the Ouachita River northward to the Mississippi River. It will begin work in the spring at the terminus of Kinkade, going south to join with Spread 1.

The remaining 346 miles is under contract to H. C. Price Co., Bartlesville, Okla. The firm has completed 276 miles and has 70 miles remaining which will be started in the spring. Three spreads, headed by G. A. Reutzel, R. L. Ezell, and W. H. Ulrich, have done the work. Price's contract covered the line between Gordonsburg, Tenn., and Catlettsburg, Ky.

**Under way, Rayne, La., to Kincade, Tenn.** Houston Contr. 370 miles laid. 130 miles left to be finished Spring of 1954.

**Under way, Gordonsburg, Tenn., to Catlettsburg, Ky.** 266 miles completed, 91 miles left.

**230 miles, gathering lines, under way.** Associated Pipe Line Contractors, Anderson Bros., Williams Bros.

**329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.**

• **Home Gas Co.**—Asking for bids on 24 miles of 12-in. from Halsey Valley to Westover, N. Y.

Also asking for bids on 25 miles of 12-in. from Port Dickinson to Deposit, N. Y.

• **Hope Natural Gas Co.**—Proposing to build a 22½-mile extension of existing line from Boone County, West Virginia, to Logan-Mingo County Line, W. Va. Est. Cost: $930,000.

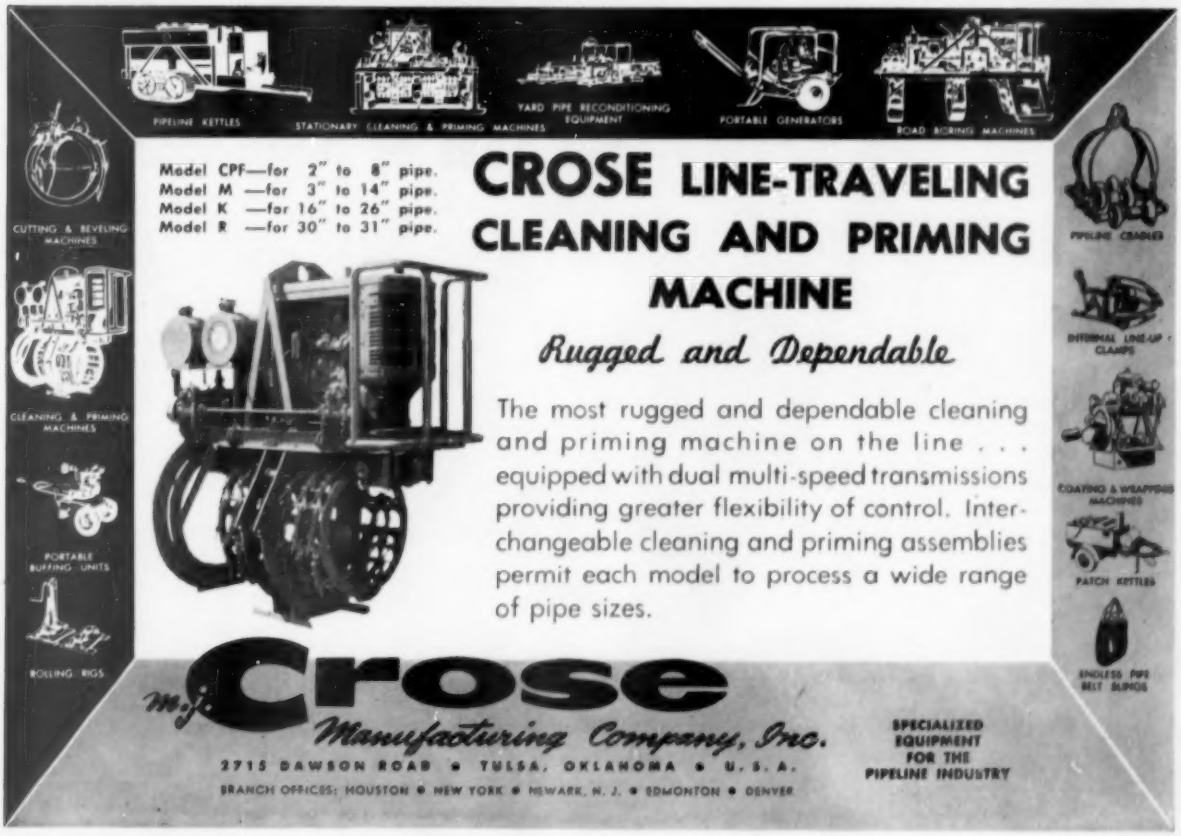
**Iroquois Gas Corp. and Tennessee Gas Transmission Co.**—Companies planning joint storage project to be known as Colden storage field in New York. The following delivery and gathering lines are planned:

17 miles, 16-in. delivery line.

62 miles, 12, 8, 6, and 4-in. gathering lines.

• **Iroquois Gas Corp.**—25 miles of 20-in. line, approved by FPC, from Iroquois' Porterville station near Elma, N. Y., to Tonawanda, N. Y. Est. cost: $1,540,000.

**Kansas-Nebraska Natural Gas Co., Inc.**—Proposes to construct 206 miles of 6-12-in. pipeline to add to present system in central and northeastern Nebraska.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Model CPF—for 2" to 8" pipe.
Model M —for 3" to 14" pipe.
Model K —for 16" to 26" pipe.
Model R —for 30" to 31" pipe.
CROSE LINE-TRAVELING CLEANING AND PRIMING MACHINE
Rugged and Dependable
The most rugged and dependable cleaning and priming machine on the line . . . equipped with dual multi-speed transmissions providing greater flexibility of control. Interchangeable cleaning and priming assemblies permit each model to process a wide range of pipe sizes.
M. J. Crose Manufacturing Company, Inc.
2715 DAWSON ROAD • TULSA, OKLAHOMA • U. S. A.
BRANCH OFFICES: HOUSTON • NEW YORK • NEWARK, N. J. • EDMONTON • DENVER
SPECIALIZED EQUIPMENT FOR THE PIPELINE INDUSTRY




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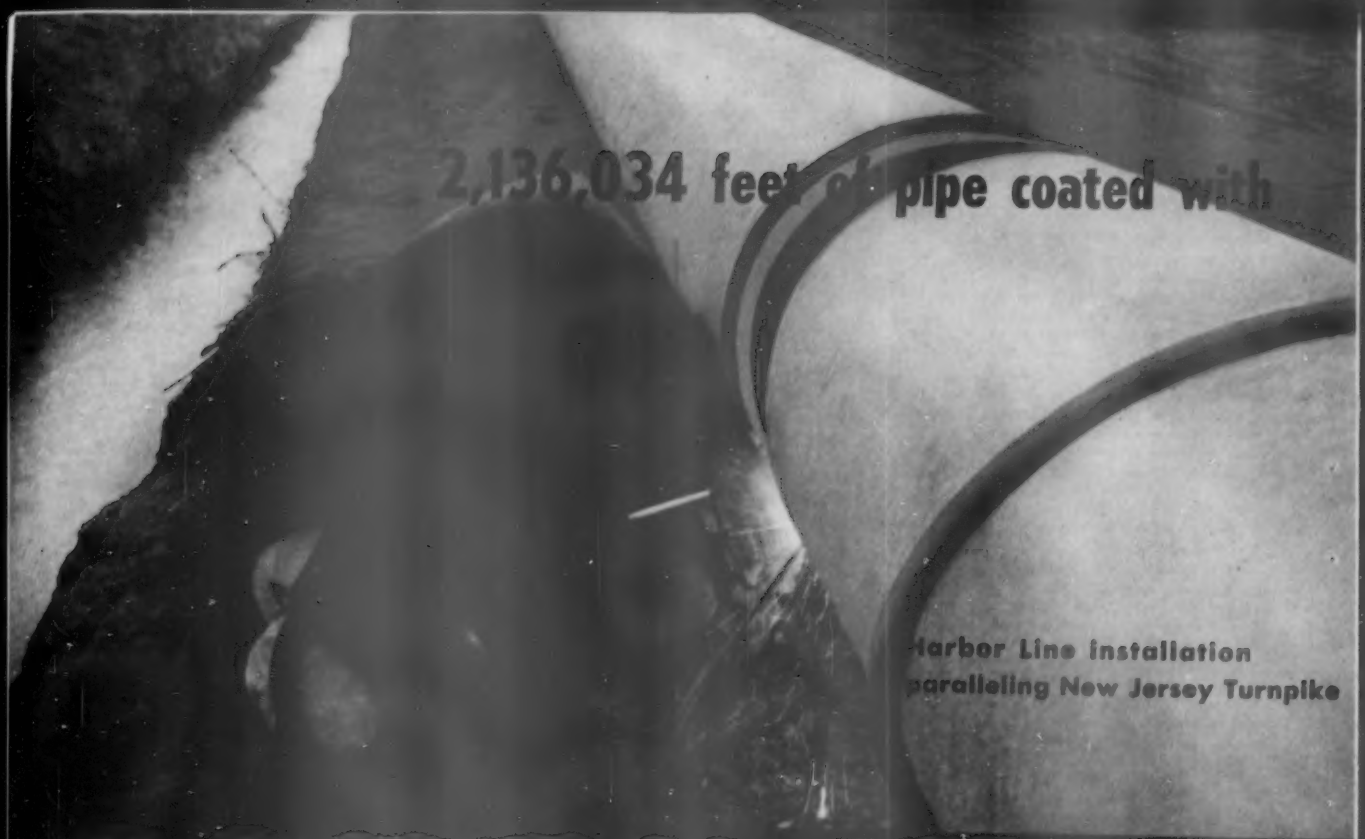
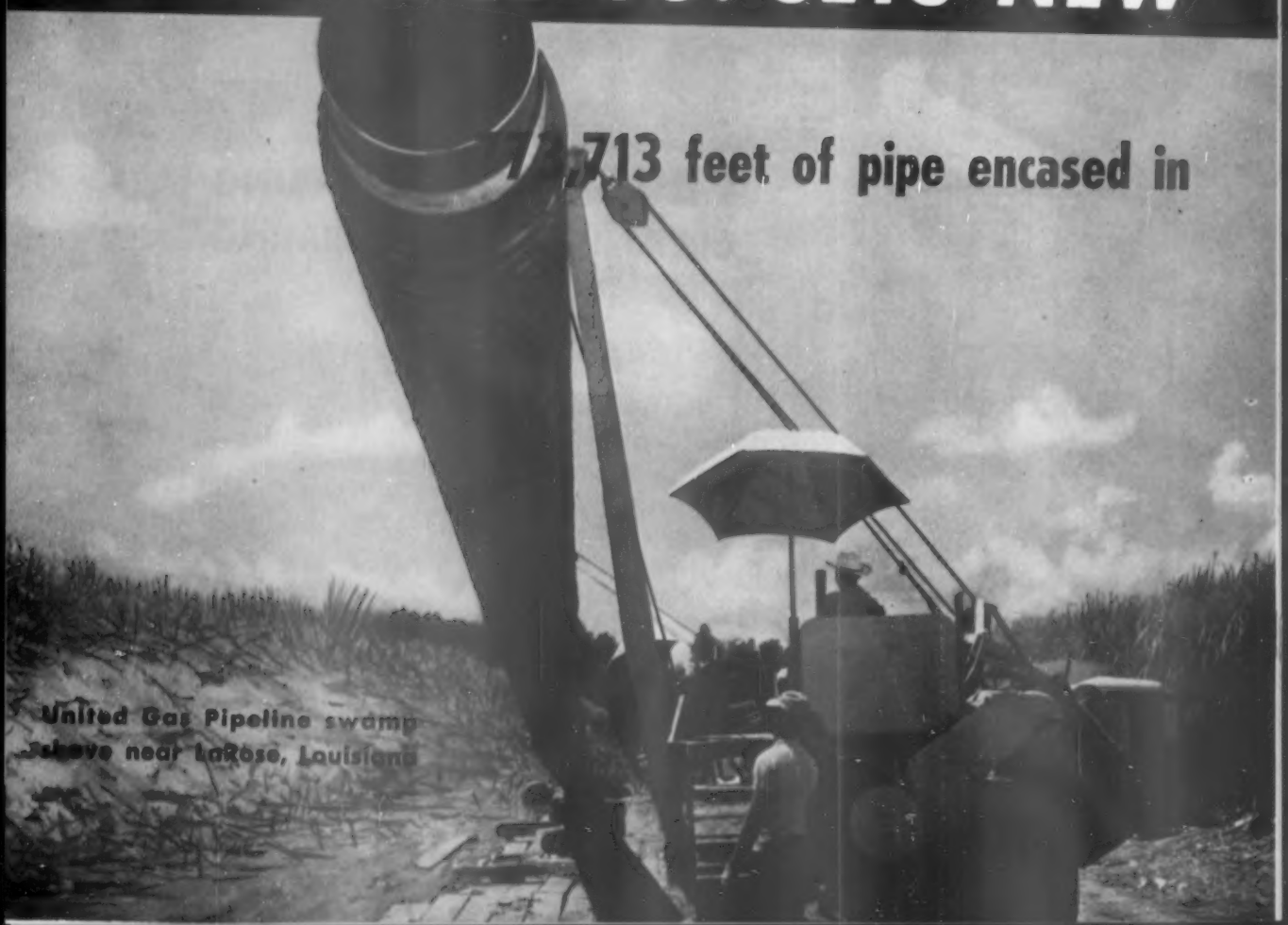



# H. C. PRICE CO. SETS NEW



# SOMASTIC*

More than 400 miles of pipe—averaging 16 inches in diameter—coated with Somastic at permanent and railhead plants by H. C. Price Co. last year. Among the users of Somastic during 1953 were

- Assures permanent protection against exterior corrosion
- Conserves steel because wall thickness of pipe needs only be sufficient to withstand operating pressures
- Adds important weight to lines where negative buoyancy is a problem
- Can be hauled and strung, roll welded, bent cold, lowered into trench and backfilled by ordinary methods without damage to coating

*Reg. U. S. Pat. Off.*

*Atlantic Refining Company*
*Buckeye Pipe Line Company*
*Detroit Edison Company*
*Duquesne Light Company*
*Gulf Interstate Gas Company*
*Gulf Oil Refining Company*
*Florida Power and Light Company*
*Interstate Natural Gas Company*
*Interstate Oil Pipe Line Company*
*Niagra Mohawk Power Company*
*The Okonite Company*
*Phelps Dodge Corporation*
*Philadelphia Electric Co.*
*Philadelphia Gas Works Co.*
*Sinclair Pipe Line Company (Harbor Line)*
*Sun Pipe Line Company*
*The Texas Company*
*United Gas Pipe Line Company*
*Wolverine Pipe Line Company*

## COATING RECORDS . . .

# HEVICOTE*

Nearly 150 miles of pipe—averaging 16 inches in diameter—was encased in HEVICOTE at permanent and railhead plants by H. C. Price Co. last year. Among the users of Hevicote during 1953 were

Hevicote is a heavy-density reinforced concrete coating designed to provide negative buoyancy to pipelines laid under water or in swamps. The thickness of Hevicote can be varied to provide the necessary weight for any pipe size in any type fluid.

- Assures sufficient weight for permanent anchorage at marine crossings
- Eliminates need for extra-thick wall pipe or expensive river weights
- Avoids costly repair or replacement of line
- Distributes structural stress evenly
- Permits easy handling because of smoothness and flexibility

*Reg. U. S. Pat. Off. Pending*

*Buckeye Pipe Line Company*
*Gulf Interstate Gas Company*
*Gulf Oil Refining Company*
*Humble Oil & Refining Company*
*Interstate Natural Gas Company*
*Interstate Oil Pipe Line Company*
*Philadelphia Electric Company*
*Sinclair Pipe Line Company (Harbor Line)*
*Southern Natural Gas Company*
*United Gas Pipe Line Company*
*Wolverine Pipe Line Company*

**Whether your pipe line job calls for coating 200 feet or 200 miles, we are anxious to discuss with you the advantages of Somastic and Hevicote. For further information, call or write:**

**PHILADELPHIA**
Phone Orchard 3-8132
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**BARTLESVILLE, OKLAHOMA**
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*Permanent and railhead coating plants*

SOMASTIC
H. C. **PRICE** CO.
HEVICOTE

PROVEN PERFORMANCE

Accepted as a standard of comparison for the industry —the Insley Hoe is rugged, fast, easy to operate.

Simplified maintenance and dependability keep this machine on-the-job . . . performing profitably.

The Insley Line includes excavators and cranes, 5 to 30 ton capacity— crawler or rubber mounted.

INSLEY MANUFACTURING CORPORATION • INDIANAPOLIS

*wholly owned subsidiary*

THE MAXI CORPORATION • LOS ANGELES


## Pipeline Patrol

• **Lateral Gas Pipe Line Co.**—27 miles, 4½ in., proposed, from Grant to Clarinda, Ia. Estimated cost: $267,200.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., proposed, Doddridge, Wetzel and Marshall counties, West Virginia.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

**Missouri Central Gas Co.**—25 miles, 6-in., proposed, Moberly to Macon, Mo.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo. FPC approved. Est. cost: $600,000.

• **Montana-Dakota Utilities Co.**—Proposes to build 56 miles of 2, 4, and 6-in. line from its 12-in. Cabin Creek-Bismarck line near Gladstone, N. D., to the towns of Lefor, Regent, New England, and Mott, N. D.

• Proposed 34½ miles of 12¾-in. line to run from Baker-Glendive field in Montana to Rapid City, S. D., and 14 miles of 12¾-in. to replace various lines in Park County, Wyoming, and Carbon County, Montana.

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia to Narrows and Dublin, W. Va.

• **North Dakota Gas Transmission Co.**—470-mile line from Tioga plant of Signal Oil & Gas Co. and Beaver Lodge field to Fargo and Grand Forks, N. D. Line will have 78 miles of 12-in., 215 miles of 10-in., 70 miles of 8-in., and 107 miles of 6-in. Estimated cost: $10,800,000.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

**Northern Natural Gas Co.**—Midwestern Constructors, Inc., has two jobs for company. No. 1 is 94 miles of 30-in. pipeline consisting of five loops (one in Texas, one in Oklahoma, and three in Kansas). 20 per cent completed as of May 20. No. 2 is 95 miles of 30-in. pipeline consisting of six loops (one in Kansas, one in Nebraska, three in Iowa, and one in Minnesota). 5 per cent completed as of May 20.

93½ miles of 20-in. from Ogden to Waterloo, Iowa; work being done by the Hallmac Construction Co. of Houston.

90 miles of 16-in. from Waterloo to Dubuque, Iowa; work being done by Engineering Construction Co. of Tulsa.

16 and 10-in. branch from Newton to Grinnel, Iowa; work being done by G. G. Griffis Construction Co. of Tulsa.

24 and 26-in. lines south of Paullina, Iowa, and 20 and 24-in. lines from Paullina to Sioux Falls, Iowa; work being done by R. H. Fulton of Lubbock.

Two underwater crossings totaling 5,100 ft. being done by Lone Star Constructors of Dallas.

• 167 miles of 24-in. line proposed to run from Farmington, Minn., to Duluth. Est. cost: $12,195,300.

• **Northwest Alabama Gas District**—40 miles, 9-in., proposed, Southern Natural's line through Windfield to Haleyville, Ala.

**Northwest Natural Gas Co.**—665 miles of unannounced size pipe to bring gas from Alberta, Canada, to the "Inland Empire" of

## Pipeline Patrol

northern Idaho and eastern Washington. Estimated cost: $36,000,000.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking and Fairfield counties, Ohio.

• 24½ miles of 20-in. line in Richland and Crawford counties, Ohio.

**Pacific Gas & Electric Co.**—200 miles, 34-in., planned, paralleling Topock-Milpitas line. 93 miles completed. 107 miles contracted to Engineers Limited Pipe Line Co. L. E. Robertson is in charge of the spread handling work from Newberry to Danby and from Los Muertos Creek to Gilroy, Calif. Completion November 1954.

15 miles, 20-in., planned for completion in 1955 from Helm Tap to Helm Junction, Calif. Alex Robertson Co.

15 miles, 12-in., planned for completion in 1955. From Herndon to Madera, Calif. Company forces.

13 miles, 16-in., scheduled for completion in 1954. From Fairfield to Napa Wye, Calif. M.G.M. Construction Co.

30 miles, 10-in., scheduled for completion in 1954. From Corning field to Chico, Calif. Company forces.

19 miles, 16-in., from Wild Goose field to Yuba City, Calif. Scheduled for 1954 completion by company forces.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

• **Shenandoah Gas Co.**—40 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va. Est. cost: $1,470,000. FPC approved.

• **South Georgia Natural Gas Co.**—368 miles, 2-12-in., planned, Phoenix, Ala., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee. Est. Cost: $9,000,000.

**Signal Oil & Gas Co.**—Groninger & King are laying approximately 100 miles of gathering lines for this company's Fox gasoline plant in Carter County, Oklahoma.

• **Southeast Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co. Start summer 1954.

• **Tennessee Gas Transmission Co.**—574 miles, 30-in., planned, Kinder, La., to Portland, Tenn.

63 miles, 26-in., planned, loops in Ohio and Pennsylvania.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U.S.-Canadian border near St. Catherines.

243 miles 24-in., planned, Coudersport, Pa., eastward across Pennsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Transmission Corp.**—Proposed, 225-mile, 30-in. line from Castor, La., to Kosciusko, Miss., to connect with its existing 30-in. line there to Connellsville and replace the "Little Inch" in moving natural gas.

• **Texas Eastern Penn-Jersey Transmission** Corp.—265 miles, 24-in., approved by the FPC from Oakford Storage field in western Pennsylvania to Texas Eastern Transmission Corp.'s Compressor Station No. 26 near Lambertville, N. J. Est. cost: $30,755,000. 54 miles let to H. C. Price Co. C. E. Shivel, superintendent.

• **Texas Gas Transmission Corp.** — 48 miles, 26-in., planned, loops from Memphis to Slaughters, Ky.

24 miles, 16-in. line planned from North Tepetate field, Acadia Parish, Louisiana, to South Roanoke field in Jefferson Davis Parish, Louisiana. Work to be done in September and October.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va.

• **Transcontinental Gas Pipe Line Corp.**—421 miles, 30-36-in., looping along Texas-New York line.

19 miles of 12.75-in. pipe starting at West White Lake field in Vermilion Parish, Louisiana, and connecting with applicant's transmission line in same parish. Estimated cost: $1,042,310. FPC approval received.

• 57 miles of 36 and 30-in. paralleling

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*Check these outstanding characteristics of the new HUMBLE Vinyl Coatings:*

✓ **EXTREME CHEMICAL INERTNESS:**
Humble Vinyl Coatings are not attacked at normal temperatures by virtually any strength of alkali or inorganic acid. These films are completely insoluble in alcohol, grease, oil and aliphatic hydrocarbons.

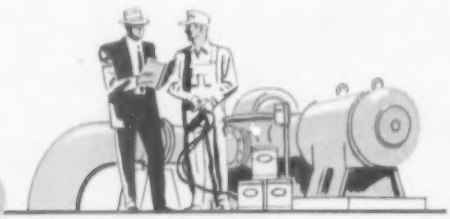
✓ **VERY HIGH WATER RESISTANCE:**
These coatings have both low permeability to water vapor and a low ratio of water absorption.

✓ **TOUGHNESS AND FLEXIBILITY OF DRIED FILM**

✓ **EXCELLENT RESISTANCE TO WEATHERING**

✓ **COMPLETE ABSENCE OF ODORS, TASTE AND TOXICITY** in the dried film.

★ Call on the Sales Technical Division of Humble Oil & Refining Co. for an analysis of your problem and expert advice on how Humble Vinyl Coatings can protect your equipment. Written recommendations will be submitted without cost.



HUMBLE VINYL COATINGS

HUMBLE OIL & REFINING CO.
P. O. Box 2180 Houston 1, Texas


## Pipeline Patrol

ections of its existing system in Louisiana, Mississippi, and Alabama. Approved by FPC. Est. cost: $6,533,000.

• 25 miles of 12-in. in Cameron and Calasieu parishes, Louisiana, to additional gas eserves. Est. Cost: $1,000,000.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.
275 miles, branch lines.

• **Trunkline Gas Co.**—Proposes to cross he Mississippi River with two 24-in. lines ear Greenville, Miss. Est. cost: $2,960,000.

• **United Fuel Gas Co.**—52 miles, 20-24-n., proposed, Wood County to Lanham, V. Va. Spring 1954.
57 miles, 30-in., under way, Lanham in Kanawha County, West Virginia, to Gulf nterstate line in Boyd County, Kentucky. Spring '54. C. R. Ice, spreadman.

**Utah Natural Gas Co.**—Planning 40 miles rom Orem to Salt Lake City, 16-in. pipe at later date. Contract not let yet.

**Virginia Natural Gas Co.**—153 miles, Buckngham to Richmond and Portsmouth, Va.

**Westcoast Transmission Co., Ltd.** — (See oreign natural gas pipe lines).

### Foreign Crude-Oil Pipelines

• **Arabian American Oil Co.**—18 miles, 12-20-in., planned, Qatif to Ras Tanura No. 1. Completion date 1-55.

**Bombay Port Trust.**—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products). Collins Const. Co. has subbed 84,000 ft. of Subaqueous work.

**Creole Petroleum Corp.**—21 miles, 34-in. crude line to run from Lagunillas field to La Salina, Venezuela. Williams Brothers Overseas Co. has contract with construction slated to start in February and to be completed in 9 months. Line when completed will be the world's largest-diameter crude line.

**Direccion General de Yacimientos Petroliferos Fiscales**—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

• **Gaz de France**—200 miles, 12-in. Ruhr to Paris, France.

**Interprovincial Pipe Line Co. and Lakehead Pipe Line Co.**—Contracts have been awarded for 604 miles of looping; 454 miles will be in Canada, the remaining 150 miles will be in the United States.

201 miles of 24-in. between Regina and Gretna, Man., have been awarded to Anderson International Contractors, Ltd., of Edmonton, Alta.

Mannix, Ltd., of Calgary, Alta., will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

Fulton-Bannister, Ltd., has contract for 125 miles of 24-in. line to connect the lines being built by Anderson and Mannix.

R. H. Fulton & Co., of Lubbock, Tex., has the contract for 104 miles of 26-in. looping from the Canadian border southeast. Anderson Bros. Corp. has contract for 50 miles of 26-in.

• **Mid-Saskatchewan Pipelines, Ltd.**—Proposed line from Smiley Viking oil field to connect with Interprovincial Pipe Line Co.'s Kerrobert pump station.

• **Pembina Pipe Line Co., Ltd.**—Company has permit to build 325 miles of 3-12-in. gathering line from Pembina field and a 72-mile, 16-in. transmission line to the terminals of Trans Mountain Pipe Line Co. and Interprovincial Pipe Line Co. at Edmonton, Alta.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

# Save Time

## . . . Use These Handy Time-Saver Cards

**Want more information on products advertised in this issue? Or do you want to know more about the items described in the "New Equipment Section"? Or would you like some of the literature here mentioned?**

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**The cards shown here are supplied for your convenience. Just ✓ ✓ ✓ check the circle with the number of the item in which you are interested, tear off the card, and drop it in the mail.**

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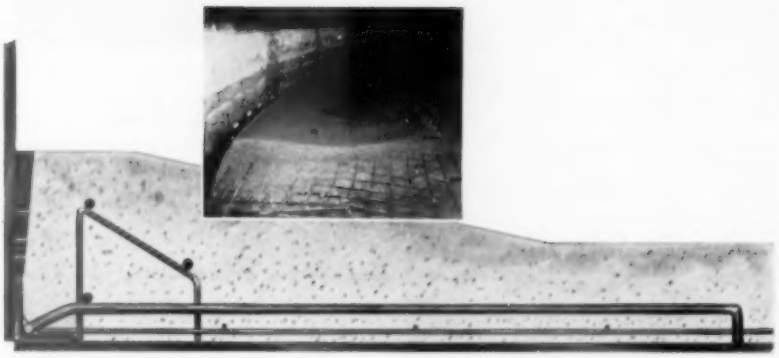
# . . . What's New in Equipment?

## Use the handy Time-Saver Cards ✔✔✔ to obtain additional information on these items

**by Dan B. Miller**



## Reinforced Concrete Stops Crude Leaks

Crude leaks resulting from steel tank bottom failures can be eliminated permanently with Tankrete reinforced concrete bottoms. The method incorporates design features, structural features, and highly specialized facilities. Tankrete bottoms are impervious to corrosive action of sour or acid crudes and installation costs are low. Maintenance is reduced to a minimum. Two point protection is assured by the sidewall seal shown in the diagram.

Concrete is poured to 12-in. thick at sidewall of tank, tapering to a 6-in. thickness on tank floor. Steel forms are used to mold caulking grove between concrete slab and tank shell. When forms are removed, caulking groove is cleaned. Bottom of groove is lined with a layer of mastic, followed by three separate layers of oakum. Hot mastic is again used to completely fill the joint. *Tankrete Concrete Bottom Tank Service.*

**Check No. 1 On The Time Saver Card**

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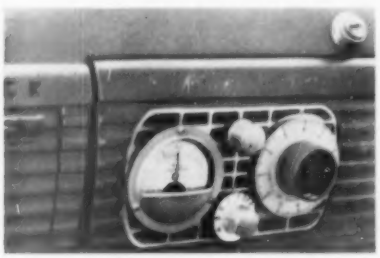


## Weight Indicator Shows Individual Wheel Loads

This weight indicator was designed to give truck drivers an easy and fast method of determining individual wheel loads in compliance with vehicle capacity and state load limits, particularly in oil-field operations.

This built-in axle load indicator permits loading vehicles to full legal capacity, thus obtaining full possible payload. It also prevents overloading. The truck operator can observe the load on each wheel by switching the dial selector. The small indicator shown, is fitted on the dash or elsewhere in the cab, to suit the driver's requirements.

It is unnecessary for the driver to leave his cab to check possible load shifts in transit. There are no vacuum tubes or other fragile or bulky circuits to be damaged. The rugged control cells are tested to 1,200 per cent overload and are certified to 500 per cent overload. *Control Cells Corp.*

**Check No. 2 On The Time Saver Card**

●

## Compact Fire Pump Delivers 400 G.P.M.

The Sigmund Rover 1S/60, lightweight fire pump represents an advance in modern fire protection. This fire pump gives the fire fighter the essential qualities demanded by the vital urgency of the job; lightweight, small bulk, easy and quick starting, fast priming, and absolute dependability at all times.

By combining the advantages of the latest Rover lightweight gas turbine with those of the Sigmund high-speed centrifugal pump, the new 1S/60 unit gives outstanding advantages. It can be run on diesel oil or gasoline.

The pump unit incorporates a single-stage centrifugal pump having a capacity of 400 g.p.m. at a total delivery

head of 231 ft. when pumping from a 10-ft. static lift, using 3 lengths of 4-in. section hose and a strainer. The impeller rotates at 4,500 r.p.m., this speed being obtained by reduction gearing incorporated partly in the pump and partly in the turbine. *Sigmund Pumps, Ltd.*

**Check No. 3 On The Time Saver Card**

●

## Recording Controllers Have New Measurement Circuitry

A new line of process instruments including potentiometric and a.c. bridge recorders and recording controllers, designed for continuous measurement and control uninterrupted by periodic standardization, incorporate new measurement circuitry and components, according to company engineers. Foremost among the new features are a mag-

## What's New... Use the handy Time-Saver Cards

netic standard in the potentiometric system and a bridge-balancing unit in the a.c. bridge system.

Both models are available with either electric or pneumatic control, and are equipped with a unique centerless pointer that simplifies chart changing and leaves practically all of the chart exposed to view for easy reading.

The new magnetic standard eliminates dry cells, slidewires, and many moving parts found in conventional potentiometric instruments.

Heart of the a.c. bridge system, the new bridge-balancing unit, supplies power to the bridge and provides a means for rebalancing it. In cases where the variable under measurement is temperature, the circuit is unbalanced by changes in the resistance bulb. Balancing is achieved by a servo motor which repositions the balancing unit's rotor.

The reinforced steel case and die-cast aluminum cover are sealed with Neoprene gasketing against dirt and moisture, and can be furnished for either wall or flush mounting. Chart speeds are 1, 4, 8, 12, and 24 hours, and 7 days. *General Electric Co.*

**Check No. 4 On The Time Saver Card**

●

### Air Drill Is for Core, Water, and Shot Hole Use

Designated as Model M-8A, a new rotary air drill for heavy duty service, is recommended for core drilling, water well drilling, and the drilling of shot and blast holes. Because of its employment of a new "air-blast" technique, it is said to drill faster and more economically than previously available rotary drills.

Rated capacity of the drilling machine is 5⅜-in. holes to a depth of 150 ft. with air, and 6¼-in. holes to 1,000 ft. with mud. Suitable for mounting on any make of truck, the rotary drill may be driven by a power takeoff from the truck engine or by a separate gasoline or diesel engine.

Its 8-in. rotary table has a capacity sufficient to support and rotate 100,000-lb. loads. Draw works are of the 2-drum type, with line capacity of 470 ft. of ½-in. line per drum. Air compressor for "air-blast" drilling is a Davy Model X300 or X400 (400 or 500-cu. ft. per minute) unit, depending upon individual requirements.

The machine's mast is of tubular open-face box type construction. It has a fabricated steel crown block assembly with two 20-in. diameter roller-bearing sheaves. Height from bottom of crown to top of rotary table is either 24 or 28 ft., in accordance with the operator's

needs. It allows for pulling 20-ft. sections of drill pipe. Mast is raised and lowered with 20,000-lb. rated hydraulic cylinders. Weight of the complete unit, including a recommended truck, is approximately 20,000 lb. *Davey Compressor Co.*

**Check No. 5 On The Time Saver Card**

●

### New Timer Unit Controls Ignition Circuit

The new Roach Timer Unit, Model TYC-101, can be used as an automatic switch on many operations for time interval control and is designed especially for engine timing by controlling the ignition circuit. Winding of the clock and setting is all done in one operation with one knob from the front of the unit.

The timer used in this unit is a spring-wound, 24-hour jeweled movement so that the unit can be set for

anything from 0 to 24 hours in 15-minute intervals and is provided with mechanical stops to prevent overwinding. The timer is enclosed in a weathertight, cast-aluminum housing with a gasketed hinged cover. The housing is provided with a 1-in. conduit opening. *Roach Equipment & Manufacturing Co.*

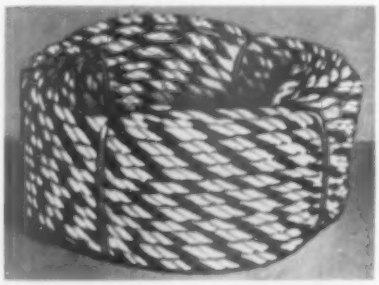
**Check No. 6 On The Time Saver Card**

●

### Two-Color Rope Designed For Safety Barricades

Ipco Poly-Rope No. 10 is designed for use in making up safety barricades around switchgear and other equipment in generating stations and plants. It can also be used to advantage on outside jobs for barrier lines and barricades. It immediately identifies a restricted area. Its high visibility is effective in that it carries out the standard caution colors.

Ipco Poly-Rope is triple-strand rope of polyethylene plastic; two strands of



yellow, one of black. It has excellent dielectric properties. There is no sag or stretch, and it will not support combustion. It is not affected by oil, and will not readily absorb dirt. Ipco Poly-Rope is light in weight, flexible, and easy to use and tie in position. It may be cut to desired lengths and ends sealed by the application of a small flame or match. *Industrial Products Co.*

**Check No. 7 On The Time Saver Card**

●

# 17 sulfur plants by..

## PARSONS

**Parsons' leadership in engineering and construction of plants for recovering sulfur from natural or refinery gases is evidenced by contracts for four new plants in the past few months. These plants are for Shell Oil Company of Canada, Sinclair Refining Company, Hancock Oil Company, and Jefferson Lake Sulphur Company.**

**The capacity of Parsons-built sulfur recovery facilities in the United States exceeds that of all other acid gas plants combined.**

**A further example of Parsons' experience and know-how is the present development of a new process for recovering sulfur from low grade native ores.**

1. Union Oil, Wilmington, California
2. Hancock Chemical, Wilmington, California
3. Hancock Oil, Long Beach, California
4. Wilshire Oil, Norwalk, California
5. Shell Oil, Jumping Pound, Alberta, Canada
6. Seaboard Oil, Silvertip, Wyoming
7. Jefferson Lake Sulphur, Mandersen, Wyoming
8. Phillips Chemical, Goldsmith, Texas
9. Phillips Chemical, Crane, Texas
10. Columbian Carbon, Seminole, Texas
11. Shell Chemical, Houston, Texas
12. Sinclair Refining, Houston, Texas
13. Consolidated Chemical, Baytown, Texas
14. Gulf Oil, Port Arthur, Texas
15. Consolidated Chemical, Baton Rouge, Louisiana
16. Westvaco Chemical, S. Charleston, W. Virginia
17. Sinclair Refining, Marcus Hook, Pennsylvania

## THE RALPH M. PARSONS COMPANY

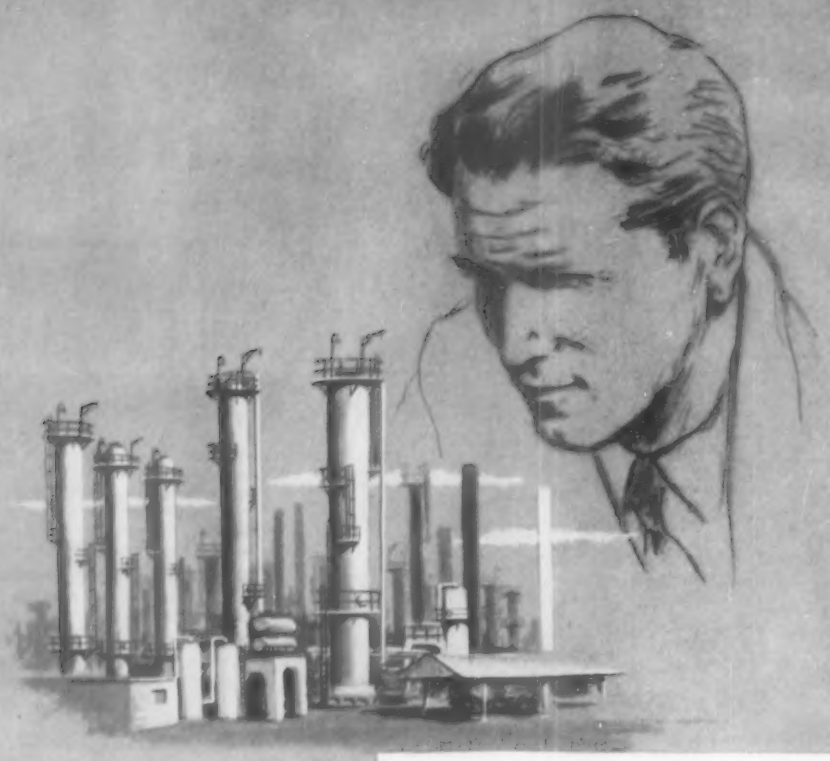
***Engineers • Constructors***

*617 South Olive Street, Los Angeles 14, California*

**NEW YORK • TULSA • WASHINGTON, D.C. • ANKARA • BAGHDAD • KARACHI**



(For more data on advertised products, use our "Time Saver" yellow cards in this issue)



# interest that can't be taxed

Here is interest on which there are no taxes . . . the interest that each Universal licensee can count upon from an organization whose entire resources and collective efforts are directed toward helping the petroleum refiner conduct his refining operations on a profitable basis.

Year in and year out, our research, development, and engineering staffs are constantly at work seeking out new approaches to the complex problems of refining . . . putting

every ounce of energy into the job of finding how some method or technique can be profitably applied to give the refiner more value for each dollar invested in processing equipment, operation, and plant maintenance.

In the interest of the refiner, Universal will continue to bring forth new methods and new techniques. Important contributions will be made toward the progress and success of those refiners availing themselves of the broad benefits derived from the application of thorough knowledge and wide practical experience in the petroleum refining field.

Interest in your business, on the part of those who serve you, is your best assurance of a satisfactory relationship. To best serve you, it is fundamental that we interest ourselves in your problems. That is Interest That Can't Be Taxed . . . the kind of interest you have every right to expect from a company whose own interests are partial to none—available to all.

**UNIVERSAL OIL PRODUCTS COMPANY**

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Laboratories: RIVERSIDE, ILLINOIS

*Universal Service Protects Your Investment*

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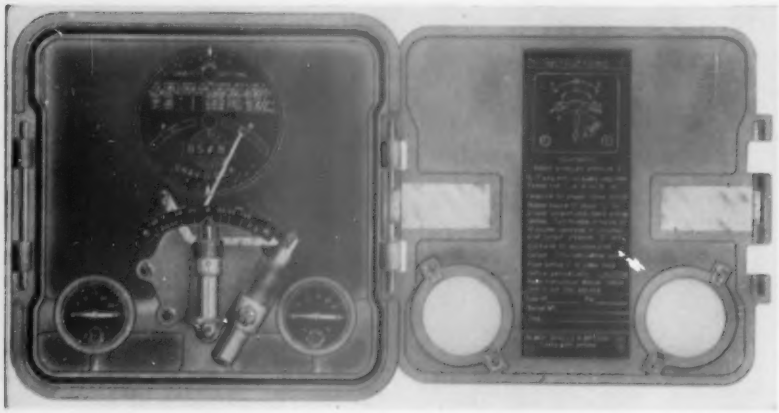

## New Pilot Features Wide Throttling Range

Type 1450 Pilot is for displacement type liquid-level controllers, where a torsion tube transmits float movements to reflect changes in liquid level or a change in gravity of the controlled fluid.

The Type 1450 features a very wide throttling range calibrated from 0 to 100 per cent. A specific gravity index provides a method of computing for various gravities of liquids or for interface services, where the throttling range is kept exact in its relationship to the specific gravity setting.

The Type 1450 is adjustable for snap or on-off action without requiring special parts. The amount of liquid-level change from open to shut positions of the control valve may be varied up to 75 per cent of displacement element length when set for snap action or can throttle over the full length of the element. *Black, Sivalls & Bryson, Inc.*

**Check No. 8 On The Time Saver Card**

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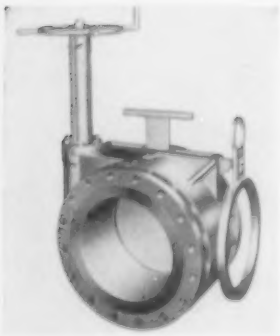

## Rigid Line Blind Valves Available in Larger Sizes

Two new sizes, 14 and 16-in. have been added to the line of Rigid-Type line blind valves. Previously the largest size available was 12 in. Created to accommodate larger pipelines being constructed for refineries, pump stations, and field installations, the blind employs an internal expansion which eliminates spreading the line.

Wherever conditions prevent spreading the line, these valves provide the only solution to the problems of positive shutoff. The valves, available in carbon steel as well as other materials, are handwheel operated to afford added leverage in clamping or releasing the spectacle plate.

Standard packing used in Hycar. Spectacle plate is made in two sections, one for full-open and one for permanent shutoff of the line. A hanger on the side of the valve body carries the section plate not in use. *Hamer Oil Tool Co.*

**Check No. 9 On The Time Saver Card**

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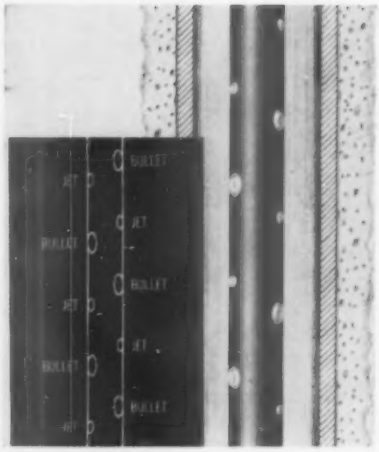
## New Gun Combines Bullet And Jet Perforation

New combination jet and bullet gun offers operators a 50 per cent saving of rig time, assures a uniform shot pattern, and provides both the superior performance of jet perforation and




penetration with the economy of bullet perforation.

The combination gun is loaded alternately with jet and bullet perforators and contains four charges per foot, all charges are detonated at the same instant with a single strand of Primacrod. Shot phasing is 120°. This instant and simultaneous detonation combined with the exclusive BJ design assures a perfect shot pattern throughout the producing interval. *BJ Service, Inc.*

**Check No. 10 On The Time Saver Card**

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## VRC Centralizer Fits Restricted Clearances

Casing is often cemented in holes of restricted clearance. Casing of 5-in. diameter or liner is cemented in 6⅛-in. hole drilled through 7-in. casing, and 5½-in. casing is cemented in 6¾-in. hole drilled through 7⅝-in. casing.

The very restricted clearance (VRC) centralizer shown was designed for this usage. The centralizer is hinged, but is mounted on the joint (not over the collar) and the holes in the four welded stops are filled in by the welder which permits the centralizer to be pulled into the hole through tight places, but permits full expansion to center the casing or liner during the cementing operation. *B and W Inc.*

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●

## They're NEW

- Bulletins
- Catalogs
- Brochures

**for your copy, check ✓ ✓ the Time-Saver Cards.**

**Instrumentation Index.** Alphabetical Index 200-C covers all issues of Instrumentation Magazine published from 1943 through 1953. Part I lists all volumes and numbers published to date, and indicates which issues are out of print; Part II is an alphabetical index of all articles, by subject, from 1943 through 1953; Part III gives an alphabetical listing of all companies and institutions covered by Instrumentation articles during this time. *Industrial Division, Minneapolis-Honey Regulator Co.*

**Check No. 12 On The Time Saver Card**

●

**Alcoa Aluminum Heat-Exchanger Tubes** presents the complete story on aluminum heat-exchanger tubes, emphasizing factors that provide the combination of low cost and corrosion resistance which makes aluminum heat-exchanger tubes attractive to industry. The first part of the 24-page, 2-color booklet covers the economics in using Alcoa heat-exchanger tubes, types of tubes, and an explanation of the corrosion protection provided by cladding. The next sections of the booklet report service and laboratory experience in the use of aluminum heat-exchanger tubes with cooling water, and discuss successful applications of aluminum exchangers in the petroleum, petrochemical, chemical, and related industries. Applications discussed and pictured detail such opeartions as catalytic cracking, desulfurization, ammonia recovery, nitric acid handling, and hydrocyanic acid condensers. *Aluminum Co. of America.*

**Check No. 13 On The Time Saver Card**

●

**Pipeline Coatings and Wrappers.** A new four-page bulletin on Mummy-Wrap pipeline coatings and wrappers describes three types of plastic pipeline wrappers, coatings for hot application by machine or by granny-rag, and hand-applied coatings for field joints, patching and reconditioning. For each of these materials, the bulletin lists specific advantages as regards protective properties, durability, freedom from holidays, and ease of operation. A line of kraft overwraps is also listed. In addition, the bulletin includes a table of material requirements for coating and wrapping ¾ to 36-in. pipe, and describes the company's field engineering service. *The Trenton Corp.*

**Check No. 14 On The Time Saver Card**

●

**Traveloader.** A new eight-page bulletin describing and illustrating the Traveloader, side-loading lift truck, designed to handle long, bulky loads, explains the Traveloader system of handling, and uses photos and drawings to show how the machine cuts aisle requirements. One section of the bulletin illustrates typical Traveloader applications and shows the different attachments available for special handling jobs, including a master pallet which carries a dozen ordinary pallets at one time. *The Baker-Raulang Co.*

**Check No. 15 On The Time Saver Card**

●

**DBPC Antioxidant.** Detailed descriptions, technical and nontechnical, and suggested uses of Koppers "dbpc" antioxidant are contained in two new bulletins. Technical Bulletin C-4-115 furnishes toxicological information, descriptions of chemical reactions, and commercial information on the product, which has been tested and proved effective as an antioxidant for hydrocarbon materials such as petroleum products. Bulletin C-4-197 furnishes information in nontechnical language on the use of "dbpc" antioxidant in petroleum fuels, lubricants, and waxes. *Koppers Co., Inc.*

**Check No. 16 On The Time Saver Card**

●

**Petroleum Bulletin No. 715** on the newly developed Lo-Cap heater, a low-priced heating unit for the Front-View distillation shields, discusses the features and applications of the heater, including specific A.S.T.M. methods. *Precision Scientific Co.*

**Check No. 17 On The Time Saver Card**

●

**Natural Gas Monitoring.** Bulletin AD-612 dscribes the costly effects of air in gas lines. By continuously measuring the amount of air (oxygen) in a system, danger of explosion and loss due to pipeline deterioration can be avoided and the heating value of gas maintained at proper standards. A pipeline monitoring system is illustrated and the required equipment is listed. *Arnold O. Beckman, Inc.*

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●


*Designed for*

**PROTECTION**

Styles illustrated
50-20 Jacket
51-05 Pants
53-15 Hat

BUILT FOR WEAR

Sawyer's "FROG" ® BRAND

**CLOTHING**

**can take it!**

**Tough** — wears like iron, takes endless snagging, scraping, chafing and still gives full protection.

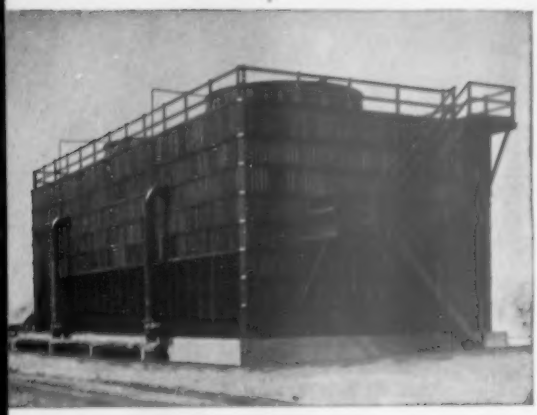
**Rotproof** — not affected by oils or chemicals — will not blister, crack or peel.

**Waterproof** — made with top quality base fabric, first saturation-coated, then coated on the inside as well as on the outside with specially blended Neoprene Latex.

Many styles — in black, yellow or Hunter's green
*Write for catalog*

THE H. M. SAWYER & SON CO.
Cambridge, Mass.

# A look inside tells why FLUOR COOLING TOWERS perform better-last longer



The ability of Fluor Counterflo Induced Draft Cooling Towers to provide years of low-cost, trouble-free service under the most gruelling climatic and operating conditions is due, basically, to sound structural and mechanical design and the consistent use of quality materials.

This is evident first in the inherent strength of the tower structure—all members and bracing take *both* tensile and compressive loads. It is evident in the sizing and design of all component parts—sheathing, trim, fan decks, stacks, filling, supporting members and anchorage.

## FLUOR TOWERS PROVIDE THESE OUTSTANDING FEATURES

*Unique Fan Blade Design*

Fluor Type HC Stainless Steel Fans, standard on every Fluor Counterflo Cooling Tower, are designed specifically for cooling tower service. Their unique air foil handles maximum air volumes at minimum tip speeds and horsepower requirements.

*Spiral Bevel Speed Reducers*

Fluor-Western speed reducers incorporate curved tooth, spiral bevel gears as standard design. They provide quieter, smoother, more efficient operation under the most rugged conditions of cooling tower service.

*Vibration Cut-Out Switch*

The Vibration Cut-Out Switch developed and patented by Fluor in 1944 protects tower structure and mechanical equipment by stopping the fan driver should excessive vibration suddenly occur.

*Gusset Plate Connectors*

Fluor Counterflo Cooling Towers alone make full use of tensile as well as compressive strength of structural members. Their internal gusset plate joint connector design duplicates that used in wooden bridge construction.

*Sloping-Bar Grid Decking*

Exclusive Fluor-designed sloping-bar grid decks are strong enough for use as scaffolding during tower erection, rugged enough to withstand the erosion of falling water. This assures the lowest maintenance and replacement costs.

*Complete Prefabrication*

Fluor Counterflo Cooling Towers are completely prefabricated. This offers many advantages to the operator. Tower parts are "packaged" for rapid delivery, marked for orderly and fast erection.

FAN DRIVER

TIP SCOOPS

FAN RING

FAN STACK

FAN DECK

FAN ASSEMBLY

GEAR REDUCER

DRIVE SHAFT

DRIFT ELIMINATORS

INNER WALL

WATER DISTRIBUTION

RISER

OUTER WALL SHEATHING

TOWER FILLING

LOUVERS

STRUCTURAL FRAMING

BASIN

BASE CASTING

BE SURE WITH **FLUOR**

THE FLUOR CORPORATION, LTD.
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MANUFACTURERS

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PHILADELPHIA
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HOUSTON
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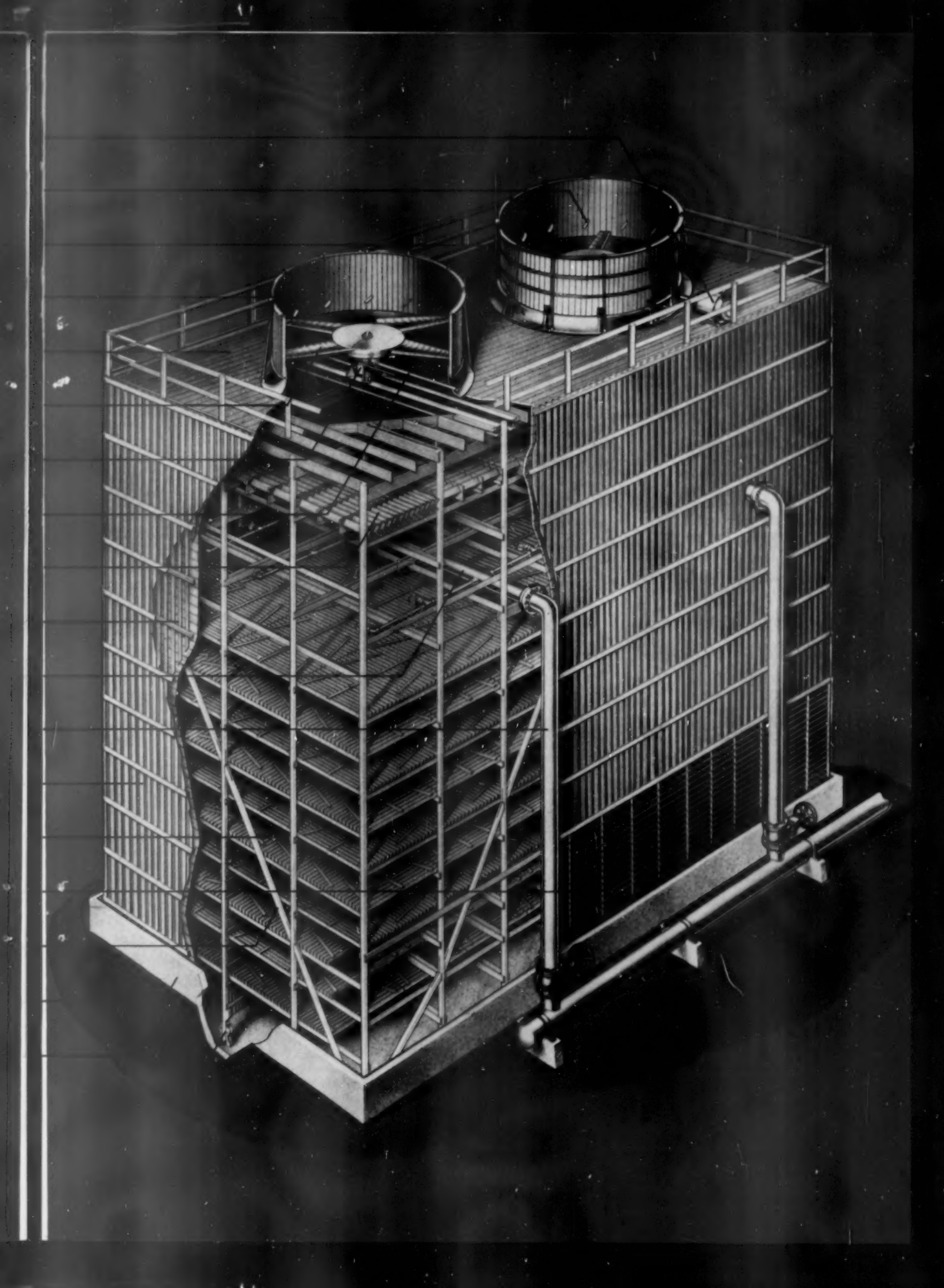
TULSA

*Write for illustrated bulletin —*
**"COOLING WATER FOR INDUSTRY."**



**New Gardner-Denver Catalog** covers the complete line of pumps, compressors, and pneumatic equipment widely used throughout petroleum and general industry. The new Catalog GP-100 has been designed to show all the products made by the company. This was accomplished by condensing the basic information and specifications for each product, or a group of closely related products into a single-sheet, two-page bulletin. These single-sheet bulletins are then bound with a plastic binding that allows the book to open flat at any page. Indexed dividers split the book into 11 product sections for greater convenience. *Gardner-Denver Co.*

**Check No. 19 On The Time Saver Card**

●

**Motor Selector.** Designed to help in quickly choosing squirrel cage induction motors for applications ranging from 1 to 200 hp., a colorful 12-page Bulletin B-2102 lists performance characteristics, construction features, dimensions, price, and other essential information. *Reliance Electric & Engineering Co.*

**Check No. 20 On The Time Saver Card**

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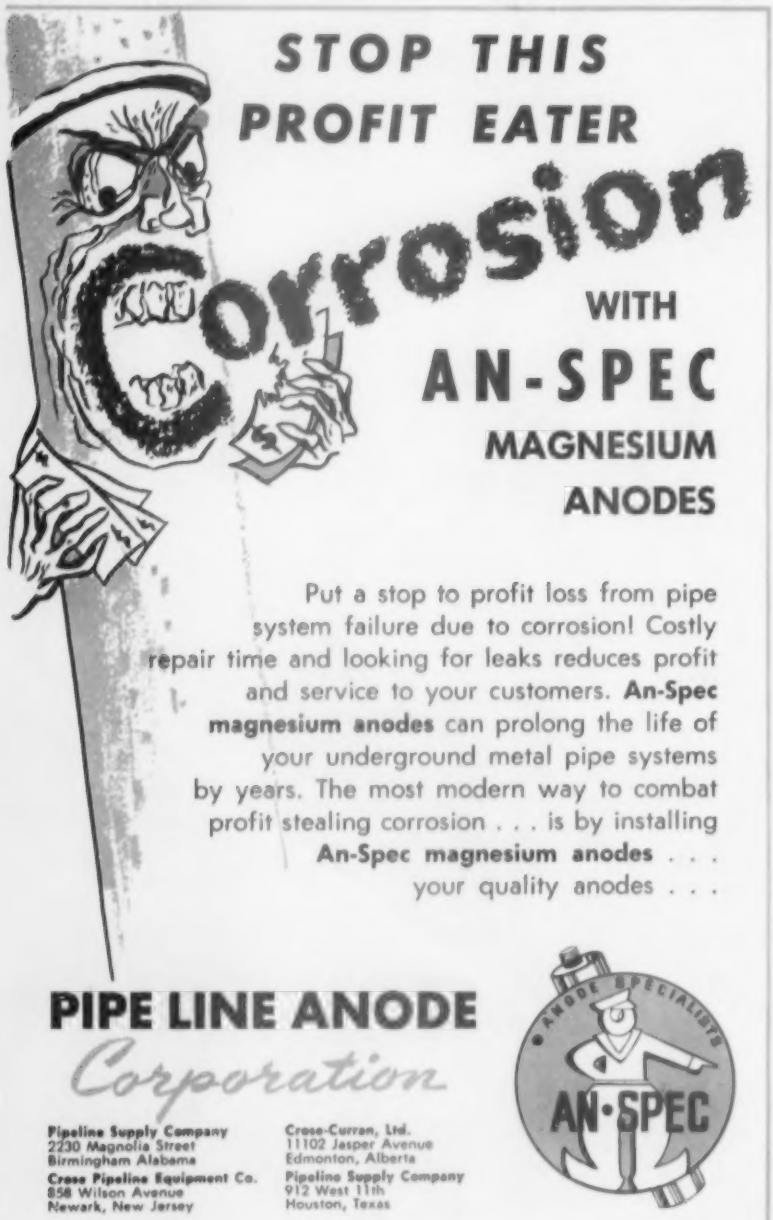
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PROFIT EATER
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ANODES
Put a stop to profit loss from pipe system failure due to corrosion! Costly repair time and looking for leaks reduces profit and service to your customers. An-Spec magnesium anodes can prolong the life of your underground metal pipe systems by years. The most modern way to combat profit stealing corrosion . . . is by installing An-Spec magnesium anodes . . . your quality anodes . . .
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858 Wilson Avenue
Newark, New Jersey
Crose-Curran, Ltd.
11102 Jasper Avenue
Edmonton, Alberta
Pipeline Supply Company
912 West 11th
Houston, Texas


**Iron Body Bronze-Mounted Grooved-End Valves,** a comprehensive, completely illustrated, four-page circular, describes grooved-end valves, available in 2½ to 8-in. sizes in standard 300-lb. w.o.g. gate valve patterns and in a 2-in. size 225-lb. w.o.g. Kingclip pattern. These valves are designed to give petroleum and refining valve users greater pipeline flexibility while reducing labor costs. The circular is complete with dimensions and price lists. *The Lunkenheimer Co.*

**Check No. 21 On The Time Saver Card**

●

**Microwave Equipment.** Two descriptive bulletins 83-520 and 83-540 feature 2,000-mc. microwave radio (Type FR) and multiplexing equipment (Type FJ). Design features of the equipment for providing reliability, flexibility, and increased system capacity are discussed. Operation of the 2,000-mc. microwave system for voice communication, telemetering, supervisory control, and relaying is described. Complete electrical specifications are given. *Westinghouse Electric Corp.*

**Check No. 22 On The Time Saver Card**

●

**Well Head Equipment,** a comprehensive new Catalog No. 54 contains an up-to-date listing of all products, including the casing hangers, Type S well heads, automatic self-sealing conduit gate valves, gas lifts, and other well head equipment. Technical data, list prices, photographs,' and schematic illustrations are included in the catalog. *McEvoy Co.*

**Check No. 23 On The Time Saver Card**

●

**New Super Seal Floating Equipment,** Authored by Grover Kilgore, Halliburton Oil Well Cementing Co., this brochure covers the features and testing of a new valve that provides a more efficient seal in floating equipment. The seal helps prevent contamination from drilling fluids and cement. Other data includes pressure, seal ring, and abrasion testing and drillability. *Halliburton Oil Well Cementing Co.*

**Check No. 24 On The Time Saver Card**

●

**How to Combat Corrosion.** A new eight-page multicolor booklet shows applications for magnesium anodes in tanks, oil-well casing, heater treaters, offshore drilling platforms, ship installations, and flow lines. *Pipe Line Anode Corp.*

**Check No. 25 On The Time Saver Card**

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# EQUIPMENT MEN . . . in the News

## McCullough Appoints Ten District Managers

**New McCullough Eastern division district sales managers are, seated: Robin Knight; M. L. Van Wagner, assistant Eastern division manager; R. W. Smith, Eastern division sales manager; J. A. Williams, assistant Eastern division sales manager; C. W. Hamilton; and T. H. Farmer. Standing are: E. H. Lain, Ross Harris, John W. Watson, Jospeh Abney, C. L. Bonds, and W. H. Wyman. William Perkins was not available for the picture.**

The appointments of ten new district sales managers to coordinate sales activities in the Eastern division of the company have been announced by O. J. McCullough, vice president, McCullough Tool Co.

Following are the newly appointed men and their respective districts: C. L. Bond, Oklahoma City; Robin Knight, city sales, Oklahoma City; C. W. Hamilton, North Texas; T. H. Farmer, West Texas; Ross Harris, South Texas; E. H. Lain, city sales, Northeast Houston; W. H. Wyman, city sales, Southwest Houston; Joseph Abney, Southwest Arkansas, Northwest Louisiana, and Northeast Texas; William Perkins, South Louisiana; and John W. Watson, Dallas-Fort Worth.

Each of the new district sales managers will work directly under the Eastern division sales manager, R. W. (Bob) Smith, and under the direct supervision of their respective district managers. The appointments were made at a recent meeting presided over by Smith with the assistance of J. A. Williams, assistant Eastern division sales manager and M. L. Van Wagner, assistant Eastern division manager.

## Estes Goes to Oil Well Survey Instrument Co.

Harry E. Estes has joined Oil Well Survey Instrument Co., Houston, as general manager. He has also been elected secretary-treasurer of Quick-Fill Corp., a new concern doing business at the same location. Estes resigned his position as executive assistant to the president of A-1 Bit & Tool Co., to accept the new appointment. He had been with A-1 for 7 years, prior to which time he was employed by Reed Roller Bit Co.

## Jacoby Named to Refinery Pipeline Sales by Oilwell

Michael Jacoby, a veteran of 37 years with U. S. Steel's Oil Well Supply Division, has been named manager, refinery and pipeline sales for its California area, Donald S. Grubbs, area manager, has announced.

Jacoby was transferred to Los Angeles from Tulsa where he had served as district engineer, refinery and pipeline sales since 1952. Starting with Oilwell in its general offices at Pittsburgh in 1917, Jacoby has been engaged in

## Deshon Named Assistant Division Manager

R. E. DESHON

The promotion of Robert E. Deshon to assistant manager of the company's Northern division has been announced by John J. Pike, president of Republic Supply Co. of California. He will be located at the firm's Northern division headquarters at San Leandro, Calif. and will be assistant to Northern division manager E. E. (Dave) Davison.

Deshon joined Republic Supply of California in 1940 as a trainee following graduation from University of California. He has worked successively at a number of the company's branch stores throughout California. In 1946 he was made a buyer in the purchasing department, then as manager of the purchase order department and all inside service departments. A year as assistant to the vice president-general sales manager was followed by an assignment gathering field data on the proper industrial uses of plastic piping.

## Camco, Regan Sponsor Gas Lift Seminar

**Working jointly, Camco, Inc., and Regan Forge & Engineering Co. officials recently arranged to bring Prof. C. V. Kirkpatrick, head of the Petroleum Engineering Department, University of Houston, to California to give a series of lectures and conduct discussions on gas lift installations. Five sessions were held under the sponsorship of the Petroleum Engineering Section, University of Southern California. The 65 enrollees attending the sessions represented key personnel from California's oil companies. Standing directly behind the center table are: Dick Regan, sales manager, and Tom Regan, president, both of Regan Forge, and Prof. Kirkpatrick.**

ONE OF A SERIES

OF SHOP TALKS

BY

JOURNAL EDITORS

# *Why does the Journal print so much industry news?*

Technical articles and engineering data are the backbone of the Journal's editorial content—yet more than half of our space can be classified as current news of the industry.

That's because news is vital to this active, competitive, oil business. Technology doesn't develop in a vacuum. It is the result of—and must be applied in—the practical, ever-changing world of economics, politics, and human affairs.

Company policies are determined in the light of current happenings and trends. So if you want to know what course your firm may follow, you must keep informed on what is going on in the industry, what the Government is doing to it, and what people of importance think about both.

The Journal is geared to furnish the kind of news that can be applied in everyday business decisions. With our weekly frequency and our big staff of trained and specialized industry observers, we bring you full and prompt reports of events which can affect your job.

It's a selective process. We don't report just everything that happens, indiscriminately. We choose news of real significance, add essential background material, and explain the meaning of events.

A new technical development is news in the oil industry, and the Journal treats it as news first. Engineering details based on results after application are carried separately in our engineering section. New oil discoveries, new pipeline plans, new refining and processing plants and methods, a bill in Congress—all these and many other happenings can influence your job.

That's why the Journal carries so much industry news.

Oil men are always interested in what others in the industry are doing, but we don't print news just because it's interesting; it has to be useful and significant, too.

Journal news is news you can use.

**THE OIL AND GAS JOURNAL**

sales work for 23 years. He transferred to the sales department at the division's Wilson-Snyder Works, Braddock, Pa., in 1931. In 1936 he moved to the Chicago sales office as sales engineer specializing in sale of pumps. He returned to Wilson-Snyder Works as sales representative in 1945, remaining there until he transferred to Tulsa.

## Denver Bank Features Oil On Display Exhibit

**Ronnie Leeper, assistant vice president and manager of the oil department and Roger D. Knight, Jr., president of United States National Bank of Denver are shown before the model rig which was a part of the bank's "Oil On Display" exhibit.**

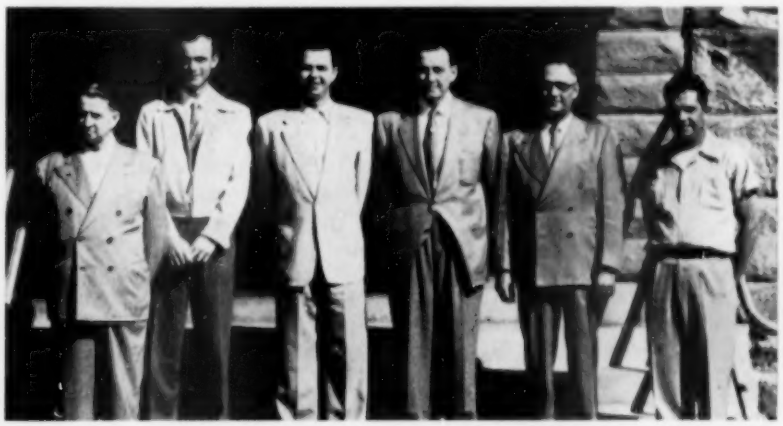
More than 13,000 people visited the "Oil On Display" exhibit during the first week it was on display in the lobby of the United States National Bank of Denver. The display, opened during the month of May, was designed to show the nontechnical aspects of the oil industry, what the oilman does, and the importance of the industry to the Rocky Mountain region and to the Denver area.

Scale models and specially constructed exhibits of the actual equipment used, trace oil activity from exploration through drilling and refining, to the neighborhood service station. Highlight of the exhibit was a model of a 133-ft. drilling rig built to exact scale and displayed by Oil Well Supply Division, United States Steel Corp. Fifteen different oil companies, suppliers, and service companies took part in the show which was jointly sponsored by the Oil Industry Information Committee and the bank.

## Wheland Signs Industrial Supply as Distributor

Industrial Supply Co., Inc., with home offices in Wichita Falls, Tex., has been signed as distributor for its line of rotary drilling equipment by The Wheland Co., Chattanooga, Tenn.

This move is part of a distribution reorganization plan of Wheland. The agreement was reached at a recent meeting in Wichita Falls between Charles Guerber, manager of Wheland's manufacturing division and Jerry Vinson, president of Industrial. All Industrial Supply Co. stores, located principally in North Texas, will carry a full line of Wheland parts and equipment.



**Members of the sales staff of Industrial Supply and the North Texas representative of the Wheland Co. shown in front of Industrial's Wichita Falls store are: R. R. Mullens, Harold R. Norman, Don J. Hunter, Marvin L. McCullough, Joe DonCarlos, and J. R. Aston. DonCarlos is the Wheland representative.**

## Teague Elected N.I.A.A. President in Los Angeles

**V. J. TEAGUE**

Vincent J. Teague, advertising supervisor, The Fluor Corp., Ltd., Los Angeles, was elected president of the Southern California Chapter of National Industrial Advertisers Association for the coming year. He was formerly treasurer of the organization and served on the national finance committee.

Other members newly elected are James Gerrard, Beckman Instruments, first vice president; Gerald Holtz, Farr Co., second vice president; Nelms Thomas, Chiksan Co., third vice president; Ed Leffler, Publishers Consultants, secretary; and Clarence Davenport, The McCarty Co., treasurer.

Board members are: Dan Ebberts, Dan Ebberts Advertising; Clyde Graham, Clyde D. Graham Advertising; and Joe Allen, McGraw-Hill Publishing Co.

## Newton Was Guest Speaker At Houston Nomads Meeting

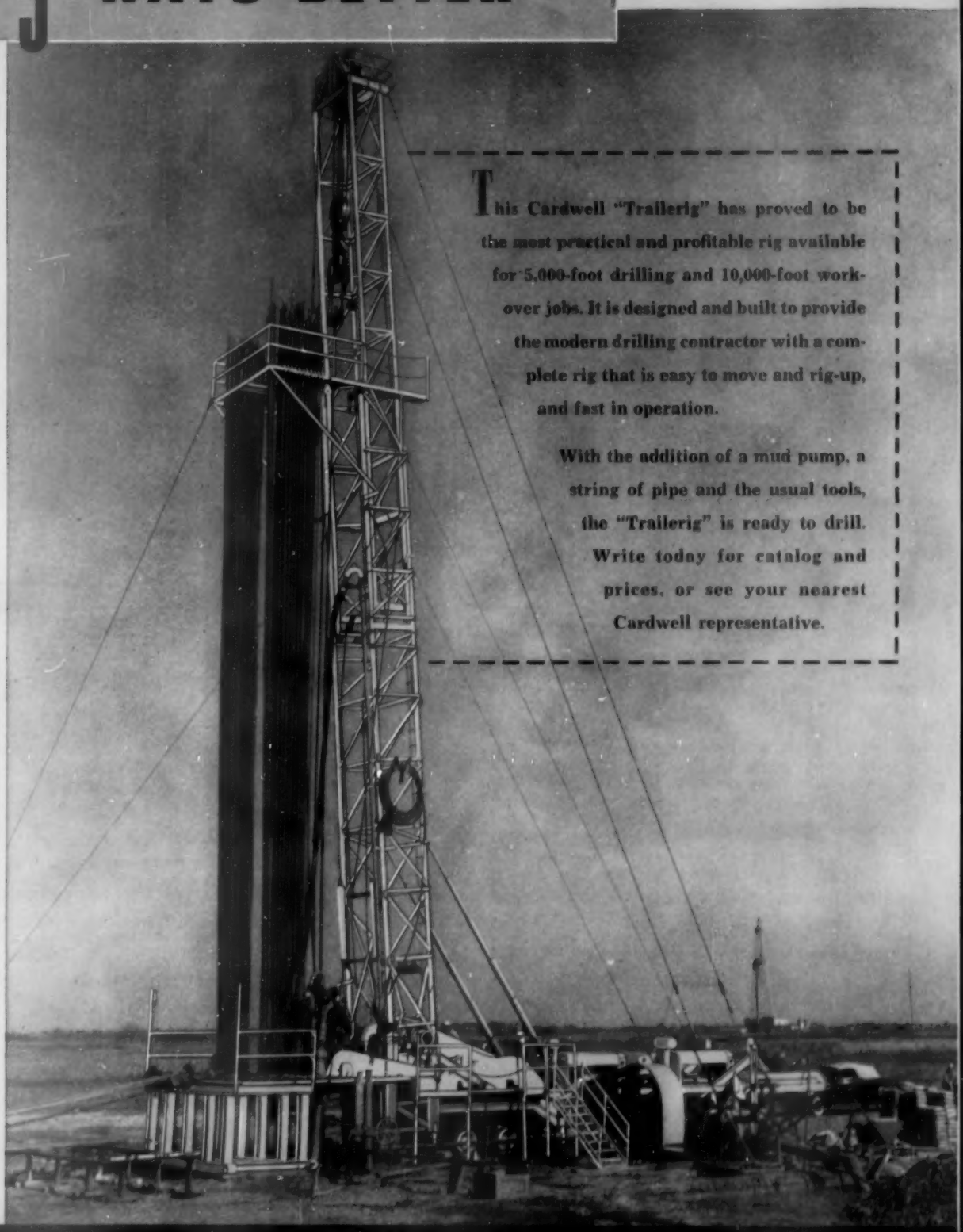
**Bill Newton, General Geophysical Co., Houston, was guest speaker at the May 10 meeting of the Houston Chapter of Nomads. Guests at the meeting were, front row: T. W. Russell, Service Pattern Works, Houston; Jeff Lucy-Smith, Socony-Vacuum Oil Co., Caracas, Venezuela; Lauro Torres, Colombian Petroleum Co., Cucuta, Colombia; Bill Newton; J. R. Lyne, Industrial Gas Supply Corp., Houston; W. H. Lyne, Sr., Pantepec Oil (retired), Tampico, Mexico; and W. H. Lyne, Jr., Hughes Tool Co., Houston. In the back row are: W. G. Dudley, Gulf Publishing Co., Houston; W. S. Crake, Shell Oil Co., Houston; I. B. Allen, Peticon, Caracas, Venezuela; Hugh Barton, Humble Oil & Refining Co., Arcadia, Calif.; and W. H. Lyne, III, St. Thomas High School, Houston.**

# CARDWELL "TRAILERIG" IS

## ...than any comparable rig

1. Mud Pump Drive is driven by draw work's engines through a Cardwell air friction clutch, which is capable of handling the full horsepower of the rig. Full horsepower of the rig can be used for hoisting and for driving the rotary and pump when drilling. Moving and rigging up is simplified with this built-in mud pump drive.
2. "Trailerig" with two engines is within eight feet road width for maximum portability regardless of the overall length of the engines. Placement of engines eliminates eccentric loading and engine overhang.
3. Truss-type trailer frame gives exceptional strength and rigidity with minimum weight.
4. All rig assemblies are easily accessible.
5. Catheads are located ahead of driller for ease of operation, maximum visibility and safety.
6. Single chain rotary drive is placed well forward to eliminate secondary chain drives to table.
7. One-way rams erect the mast and are supplemented by one-way leg receiving rams which support the mast as it goes over center and push the mast over center when lowering.
8. No trailer ramp is needed with the "Trailerig"; this eliminates extra loads and rig-up time.
9. Driller has maximum visibility, both to the rotary table and up the mast to the racking platform and crown.
10. Ample space is provided under platform for blowout preventers and wellhead connections without using ramps. Complete accessibility from either side.
11. Crown sheaves are mounted on Timken bearings for maximum service and life.
12. "Trailerig" is a completely unified design combining draw works assembly and telescoping mast with trailer frame.
13. Every wearing part of the "Trailerig" is heat-treated for wear resistance and long service life.
14. Two-engine drive gives power necessary for modern drilling operations, yet the "Trailerig" does not exceed 8-foot road width.
15. Circulating water-cooled brakes are standard equipment. 22″ single Parkersburg Hydromatic brake is available for auxiliary braking.

# 15 WAYS BETTER



This Cardwell "Trailerig" has proved to be the most practical and profitable rig available for 5,000-foot drilling and 10,000-foot work-over jobs. It is designed and built to provide the modern drilling contractor with a complete rig that is easy to move and rig-up, and fast in operation.

With the addition of a mud pump, a string of pipe and the usual tools, the "Trailerig" is ready to drill. Write today for catalog and prices, or see your nearest Cardwell representative.

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THIS TRADE MARK INSURES HIGHEST QUALITY AT LOWEST PRICE

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THERE IS A CARDWELL PARTS STOCK NEAR YOU IN EVERY OIL FIELD OF THE WORLD

# 20 ft. More Hole per day with DRISCOSE*low solid emulsion!

Drilling time was carefully checked in four wells in West Texas. All the wells were in the same field. Similar formations, similar operating conditions were encountered in all four. Results showed that the well drilled with a DRISCOSE low solid emulsion mud averaged 20 feet more hole per day than the other wells drilled with conventional mud. To find out how you can make hole faster . . . and use fewer bits, write for complete information on DRISCOSE low pH, low solid emulsions.

DRILL WITH

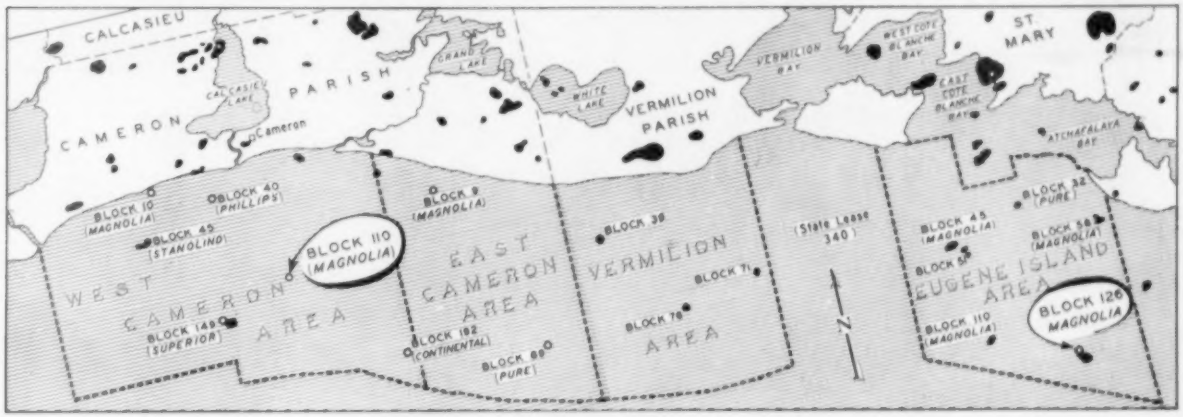
**DRISCOSE***

**DRILLING SPECIALTIES COMPANY**

BARTLESVILLE, OKLAHOMA

*DRISCOSE is a trademark for Sodium Carboxymethylcellulose.

# EXPLORATION




**Two major oil discoveries on the Continental Shelf off Louisiana are expected to stimulate deep-water exploration in that area.**

# Two New Strikes Spur Tidelands Search

**by Frank J. Gardner**

IN the intensive and highly expensive search for oil on the Continental Shelf, two recent strikes have given encouragement to the oil industry's belief that the so-called "tidelands" offer the most likely hunting ground for new oil reserves in the United States. Both of the new discoveries lie off the southwestern Louisiana shore. Both are operations of Magnolia Petroleum Co., with Continental Oil Co. and Newmont Oil Co. as coowners.

### West Cameron, Block 110

In the West Cameron area, at Block 110 (see map), the operators claimed title to the first oil field on federally controlled lands in the Gulf of Mexico since the settlement of the tidelands ownership argument. Located 18 miles offshore from Cameron Parish, Magnolia et al. 1-A Lease 1153 flowed 406 bbl. of oil daily on a 2-hour gage through an 11/64-in. choke to establish the field. Production is coming from Miocene sand at 8,143-50 ft.; drilling operations had been carried to 10,628 ft. before plugging back for completion. Further production possibilities for the field were indicated by a flow of gas and condensate at 10,125 ft. before the plugback.

**Offset announced . . .** The three participating companies in the Block 110 discovery hold about 12,500 acres in leases surrounding it. The past week, they announced plans for an offset well, Magnolia et al. 2-A State Lease 1153, to be drilled to 12,000 ft. from the same platform as the discovery well. The bottom-hole location for this second test will lie at a point 1,320 ft. south 50° east of the drilling platform.

Appraisal of the discovery must necessarily await further drilling on the structure.

### Eugene Island, Block 126

To the east, in the Eugene Island area offshore from St. Mary Parish, (see map) the same operators have brought in a significant new well at Block 126 field. The Magnolia et al. 4-F State Lease 691, situated on the north flank of the structure, found prolific oil sands that have prompted estimates of new oil reserves ranging from 50 million to as much as 100 million barrels.

**Sands 800 ft. thick . . .** This, the eleventh oil well in Block 126 field, reported net effective oil-saturated sands 800 ft. thick in at least 17 different producing zones, with more than 200 ft. of the sand lying above 5,450 ft. The well was drilled to a depth of 8,650 ft., and operators have reported production tests from only 2 of the 17 potential pay zones. From a sand at 7,265-86 ft., oil flowed at a rate of 349 bbl. per day through a 13/64-in. choke, while a lower sand produced 512 bbl. a day on 12/64-in. choke. Gravities are in the 38° to 39° category. Both sands are new to the field.

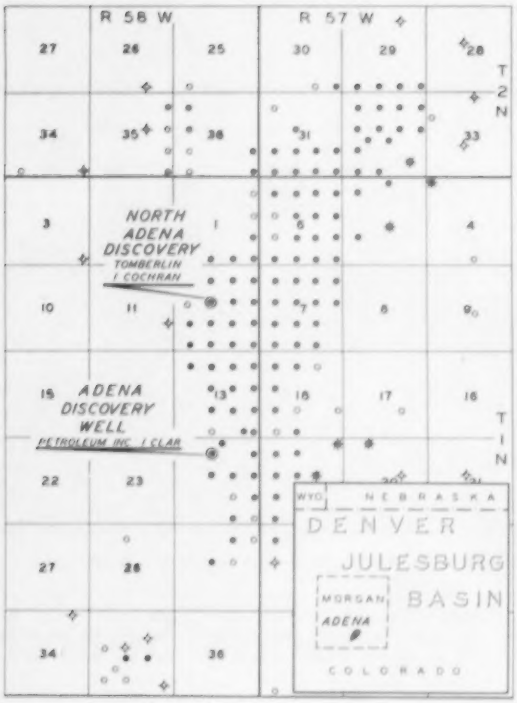
**Farthest offshore field . . .** Eugene Island Block 126 field lies farther offshore (23 miles) than any production yet established on the Continental Shelf. Discovered in 1949, it now has 11 oil wells, 2 gas wells, and 4 dry holes to its credit, with production coming from depths as great as 12,200 ft. The new Magnolia discovery lends added significance not only to the field, but to the entire Continental Shelf oil search.

### Federal Regulations Set

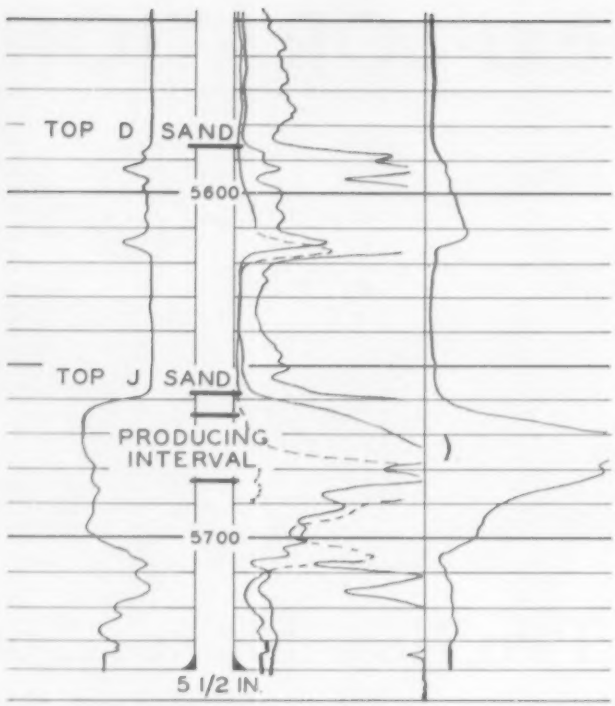
These two major discoveries on federally controlled lands occurred almost simultaneously with the announcement of shelf oil controls by the Department of the Interior. The conduct of exploration and development operations has been vested in the U. S. Geological Survey, and supervisory USGS offices are now being set up in New Orleans and in Houston.

The operating regulations authorize the USGS to hold hearings on the fields, approve drilling and development operations, set allowables, and to collect rentals and royalties.

Operations now are under way on three more deep tests on federal offshore tracts in the West and East Cameron areas. If they hit, we shall have entered a new era of Continental Shelf explorations, and the USGS will find itself with plenty to do.




ADENA FIELD development, with development wells indicated.




ELECTRIC LOG of producing section in North Adena discovery well.

*Though it was just discovered last November . . .*

# Adena Now Second-Best Colorado Field

IN slightly more than 6 months since its discovery, Adena field, Morgan County, Colorado, has become the second largest producer in the state, and one of the better fields in the Rocky Mountain region.

The field discovery well was completed in late November last year. At the end of the year three wells had been completed in the area. By May 22, a total of 115 oil wells, 4 gas wells, and 9 dry holes were completed. Production had risen to more than 10,000 bbl. per day in the meantime.

**Rapid development . . .** The field is the second in the Denver-Julesburg basin to reach proportions of this kind. The Little Beaver-Badger Creek pools south of Adena in Washington and Adams counties reached a production of better than 10,000 bbl. per day after a development program which extended through much of 1952 and 1953. The rapid development of Adena, still in progress, has given it an edge over the Little Beaver-Badger Creek area, and promises to increase the field's leadership in the Denver-Julesburg basin by an even more considerable margin.

The northern limits of production at Adena extend to within 10 miles of the town of Fort Morgan, which is directly north of the field. Like earlier developments within this basin, the trend of production lies along a general northeast-southwest axis. In recent weeks discoveries to the south and west have promised development of the same type of "peripheral" pools as those existing around Little Beaver field, with the relationship apparently about the same as to distance and relative location. The discovery to the south is already a separate pool judging from results obtained to date. The very recent discovery a mile west of previous production in the field has not yet been completed and there has been no drilling between it and the field proper. It lies within the projected trend from the north, and if further drilling joins it with the principal field area, a very substantial addition to the total Adena producing area will be made.

### Morgan County . . . "J" sand discovery of North Adena field

Bill Tomberlin 1 Cochran
SE SE NW 12-1n-58w

**Spud 11-1-53; 8⅝-in. casing at 5,734 ft.; elev. 4,547 KB; Log tops: Niobrara 4,756 ft., Fort Hays 5,153 ft., Base Fort Hays 5,190 ft., Greenhorn 5,240 ft., Brown lime marker 5,495 ft., "D" sand 5,586 ft., "J" sand 5,658 ft.; DST 5,657-88 ft., 1 hour, gas in 11 minutes. Flowing oil by head in 50 minutes. DST 5,608-5,615 ft., 2 hours, gas in 30 minutes, SI 20 minutes, recovered 20 ft. mud, 75,000 cu. ft. gas, FP 0-100 psi., SIP 1,460 psi.; DST 5,659-90 ft., 1 hour, gas in 11 minutes, flowed oil in 50 minutes, unloaded for 1 hour, 40 minutes, recovered 200 ft. heavily oil-cut water; FP 1,190-1,420 psi. B.h.p. 1,530 psi.; TD 5,734 ft.; 28 ft. pay, perfs. 5,665-83 with four shots per foot; tested 60 bbl. oil per hour, 3-hour test.**

### Field History

The Adena discovery was drilled by Petroleum, Inc., of Wichita and Denver.

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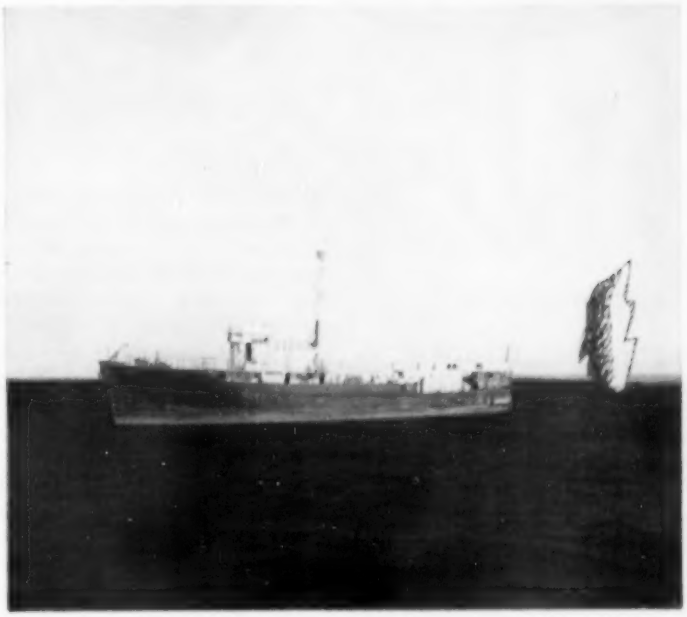

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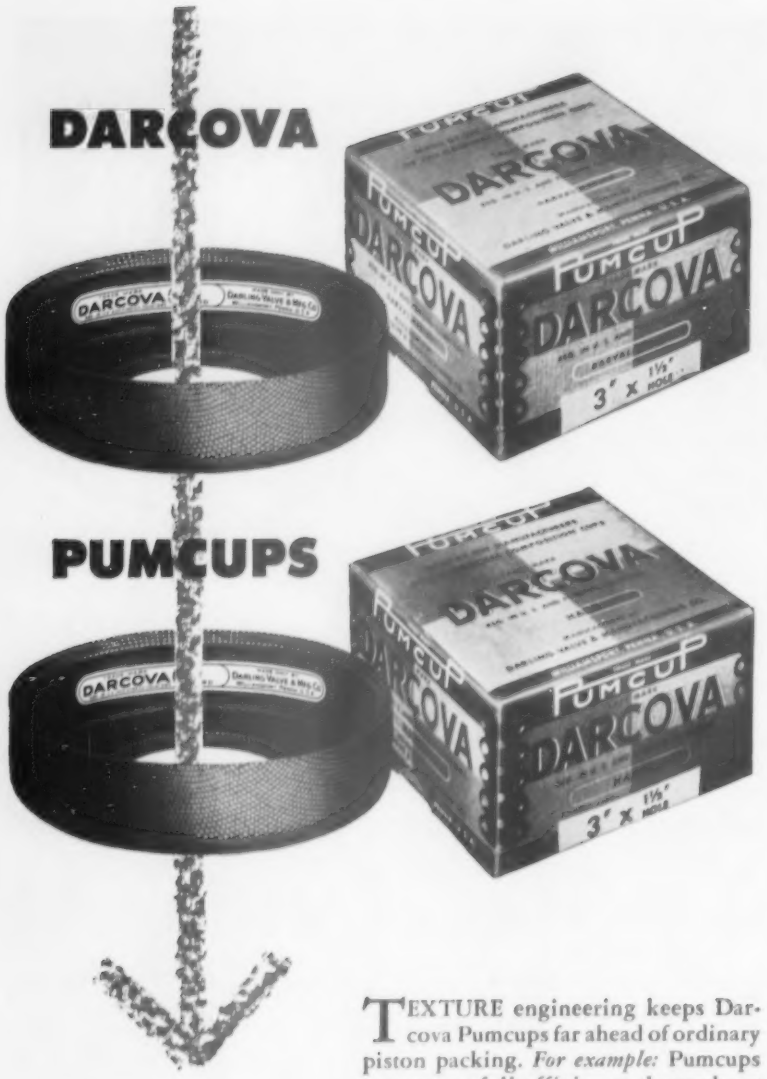


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The well, 1 Clar, SE NE NW 24-1n-58w, found D sand production in the interval 5,650-58 ft. and was completed for an open flow of 12 bbl. of oil per hour. Total depth was 5,870 ft., with top of D sand found at 5,639 ft. The J sand did not produce.

Immediately following completion of this well, Bill Tomberlin of Denver reported a gage of 60 bbls. per hour on 3-hour test of J sand at 1 Cochran, SE SE NW 12-1n-58w. It was completed from the perforated interval 5,665-83 ft.

The Tomberlin discovery was designated North Adena until the very substantial drilling program which followed completion of these two wells joined the two producing areas, with production over much of the field established in both D and J sands.

### Field Limits

At the present time the northern limit of production at Adena is in the south half of section 29-2n-57w. Failures have been drilled in NE 29-2n-57w, in SE SE NW 28-2n-57w, and in NE SW 33-2n-57w. At the southern end of the field Shell Oil Co. drilled a failure in SE SW NW 30-1n-57w. Lion Oil Co.'s failure in NE SE 11-1n-58w is the only indication of a western limit to production. It is midway from north to south limits of the field proper. Farther south, Lion Oil is now testing 1 Bruce, SE NE NW 26-1n-58w, which flowed on oil drill-stem test of J sand. It is more than a mile from nearest production, and is the apparent discovery west of the field proper referred to above.

There has been no infield failure. Failures cited above are significant in indicating limits to the principal area of production, but can not be regarded as having done more than furnish such an indication. A considerable amount of additional work will be required before a definite outline is approached.

### Field Operators

Development of the field has been largely conducted by Lion and Pure Oil companies. These firms held leases on the area initially, and successful drilling was on farmout acreage. Pure Oil is the majority interest holder through the field. S. D. Johnson and others have drilled several wells on the northeast end of the producing area, and other operators involved in Adena development include Falcon Seaboard Oil Co., Eddie Fisher, Tri-Mark Oil Co., British-American Oil Producing Co., and U. S. Smelting, Mining & Refining Co. A number of independents active in the area are represented as interest holders to varying extents. The area is fee land and some small tract development has been done on leases held out

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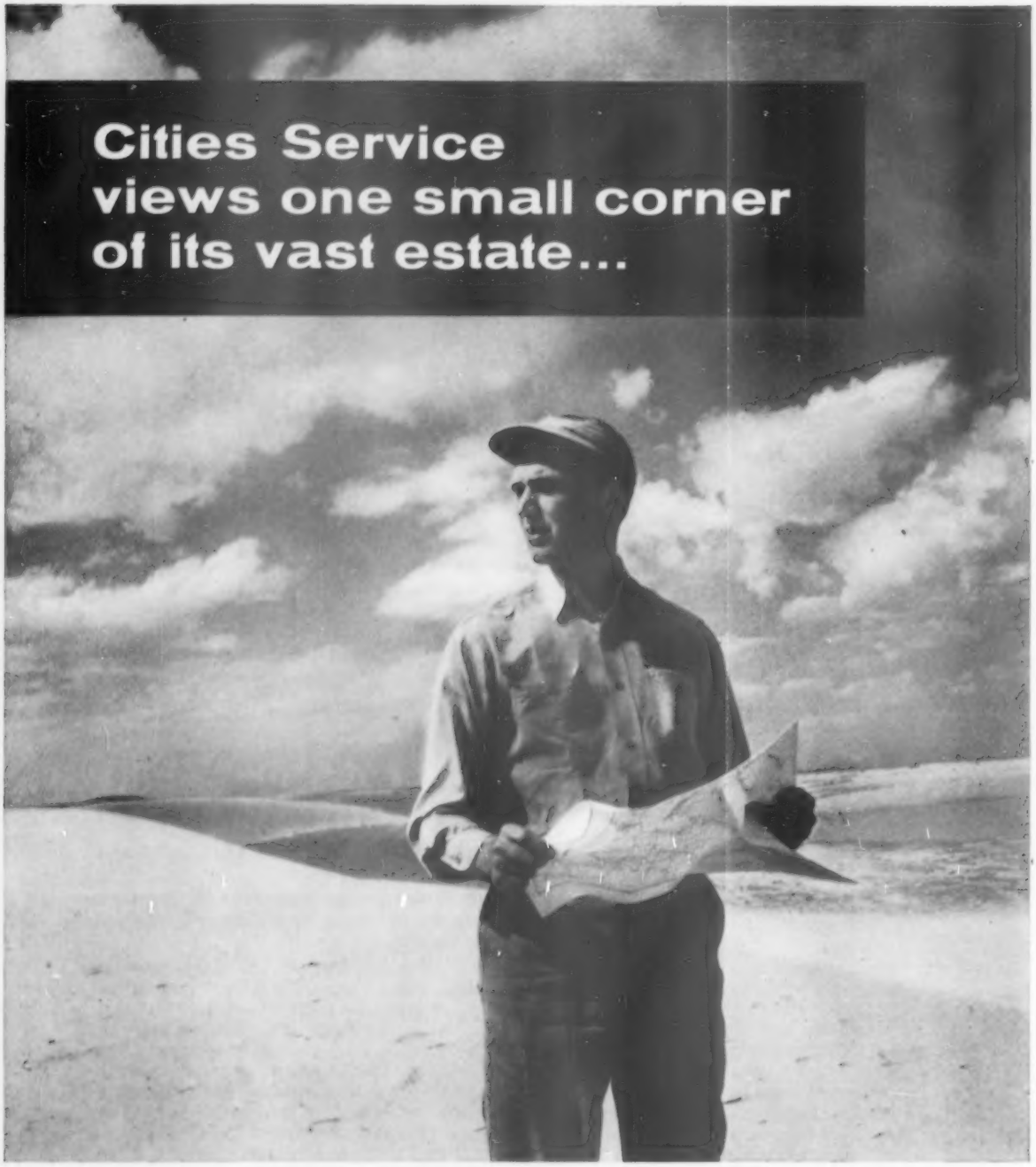


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by individual owners during the large scale leasing of the Denver-Julesburg basin during the past several years.

### Gas Production

Along the east side of the field gas production has been established, with the gas area roughly paralleling the axis of oil production. There has been very little drilling east of these gas wells. Four wells are now in progress beyond the eastward limits of gas production, but have not reached critical depth. Lion Oil had failures in Section 20 and 21, 1n-57w, east and south of gas producers, but these dry holes offer no definite indication of what to expect along the considerable extent of the field to the north. Drilling at Little Beaver established substantial oil production on both sides of the gas-producing area in that field.

### Reservoir Characteristics

No set of definite characteristics can be assigned Adena field on a blanket basis. The range of porosity, permeability, thickness of section, and potential of completed wells is very wide. Completions have run to very good potentials generally. Recoveries at the rate of 700 to 900 bbls. of oil daily on ½-in. choke have been common. A majority of completions in the field are flowing wells. Some are on pump, however, and gages range downward to the neighborhood of 100 bbls. per day. Top flowing potentials have been about 1,500 bbls. per day.

Thickness of producing zone has been found as great as 55 to 60 ft., and the range is downward to as little as 7 or 8 ft. A suggested average of 20 to 25 ft. for the field appears within reason.

**Porosity-permeability . . .** Porosity over a majority of the field will approximate 20 to 23 per cent. Permeability ranges from about 10 to as high as 1,200 md. accounting for the wide range of gages reported at completion of wells drilled to date.

Gravity of production is approximately 40°, and like most Denver-Julesburg oil, Adena crude is a good grade, commanding top posting.

### Major Influence on Basin

The field has had a major influence on the Denver-Julesburg basin's total activity during 1954. The 115 oil wells completed in the field are a substantial portion of the 180 producers completed in the entire state of Colorado to May 15. The effect on Morgan County exploration has been very pronounced. During the first 4½ months of this year 51 wildcats have been drilled in the county. Of these, 48 were failures.


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The three discoveries were at Adena South, where eight wells have produced five producers, three failures; at Gary, in 16-1n-56w, where a west offset was dry, and at Sand River in 26-1n-56w where four producers and no dry holes have been completed.

By comparison, in 1951 a total of 17 wildcats and 7 development wells were drilled in Morgan County. In 1953 the county had 43 wildcats and 8 infield wells drilled.

**Fort Morgan-Brush areas . . .** The very heavy drilling program which has been carried on in the Adena area has moved the center of Denver-Julesburg basin operations to the Fort Morgan-Brush areas. The previous program in Little Beaver had a substantial effect on the two towns, but the still-unabated Adena program has been of more influence.

Both towns are agricultural centers, and are located in the principal beet-producing area of the state. Prior to oil development in this portion of the basin, agriculture, particularly beets and sugar manufacture, was the economic foundation of the area.

Recent location of operating headquarters of some of the area's most substantial independents and field offices of major companies in Brush and Fort Morgan has changed the outlook of both towns. Fort Morgan, most directly affected because of its position closer to the field, has been less aggressive than Brush in seeking industry operations.

**Pipelines . . .** When it became apparent that the field was developing into one of the major areas of the basin, Pawnee Pipeline Co., a Pure Oil-Sinclair Oil & Gas Co. subsidiary proposed a pipeline from Adena to the Merino terminal of Toronto Pipeline Co.'s feeder line to the Platte Pipeline at Gurley, Neb. This line is now in construction.

An earlier line was built to serve the Little Beaver-Badger Creek area, and connects these fields with the Merino end of the Toronto system. It was not planned to handle the output of a second field larger than those it originally proposed to serve, and even though it passes relatively close to Adena, another line was a better solution to the outlet problem when field development became substantial.

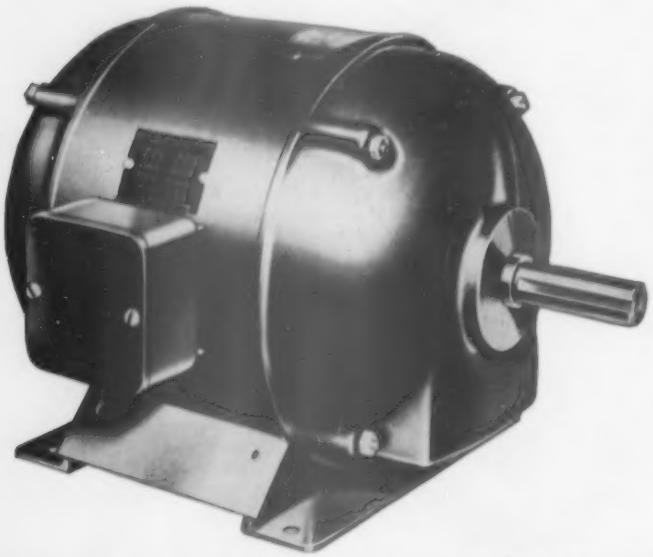
**Active rigs . . .** Upwards of 70 rigs are now in operation in Colorado. A majority are in the Denver-Julesburg basin, with many of these now working the Adena area. This concentrated drilling program is certain to continue until full definition of Adena field has been completed. The rapid drilling, relatively low cost of completion, and assured outlet have made the area an attractive investment for majors and independents alike.

**Acreage . . .** Development of this field has followed a pattern familiar to operators in the Denver-Julesburg basin. A large amount of total acreage leased is held by larger companies, and substantial farmout programs to independents have been the rule. A major development, such as Adena or Little Beaver, brings the larger company back into the picture on remaining acreage and generally provides for a more rapid development of an area of this size.

Adena field proper now includes a proven area of some 6,500 acres. No limits to the productive area are now definable, and continued drilling at the present high rate may be expected in the area until some definition of producing area is had.

### Impact on Basin

This field, even more than Little Beaver, has helped to change the concept of the Denver-Julesburg basin. Early work through the basin produced a large number of small pools, many one-well pools. With a few exceptions, earlier fields were relatively minor in area, and were rapidly developed. Producing sections varied greatly, but in most cases were relatively thin. Deve-

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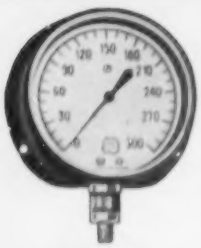

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lopment of Adena and Little Beaver has added to the interest in the entire basin through demonstration of the fact that discoveries may be of considerable consequence from a reserve standpoint.

The spotty and comparatively small fields along earlier trends in the basin rendered the discovery of Permian oil in the basin in 1953 of major importance. Permian was regarded as a reservoir of major possibility. It still is, despite the fact that only one field of consequence has resulted from deeper drilling.

Discovery and development of Little Beaver and Adena have demonstrated the presence of substantial fields in the Cretaceous D and J sands, and the very heavy exploratory program to these formations will not soon recede since the potential of the relatively fast and easy Cretaceous drilling has been shown to include fields of the caliber of Adena.

## OKLAHOMA

### Panhandle Field Well Is New Pay Opener

Gulf Oil Corp. 1 Hixon, NE NW 11-4n-10ECM, located in the southern portion of the Guymon-Hugoton field, Texas County, added the Cherokee sand as a new producing horizon for the area.

A 12-hour gage through 15/64-in. choke from perforations at 4,006-28 ft. was 161 bbl. of oil. Flowing tubing pressure was 240 psi. Top of the section was logged around 4,019 ft., on elevation of 3,636 ft. First drill-stem test of the sand, from 4,022-44 ft., developed 3,270 ft. of oil and 250 ft. of heavily oil and gas-cut mud. The well topped the Morrow sand, regular pay for the field, at 4,424 ft. and a test between 4,423-26 ft. recovered 2,570 ft. of oil plus 30 ft. of salt water.

**Oklahoma County . . .** Webster Drilling Co. 1 James H. McNew, east of Artesian Springs, was running casing to total depth of 6,681 ft. after testing salt water in the second Wilcox sand between 6,660-81 ft. This well previously found discovery production in Misener sand at 6,109-17 ft., where it flowed oil in 30 minutes, estimated at the rate of 10 bbl. an hour.

**Garvin extension completed . . .** Carter Oil Co. 1 Teter, south extension to South Panther Creek pool of Garvin County, has been completed for 120 bbl. of oil a day. Completion was natural and through ¼-in. choke, from open-hole pay between 7,308-50 ft. Flowing pressure was 1,800 psi.

Sinclair Oil & Gas Co. 1 Community-Mollie L. Shelton, new strike or long extension south of production in Northeast Purdy pool, Garvin County, was ready for fracture treatment and production tests after perforating casing at 8,903-34 ft. in Hart sand. Swabbing recovered 52 bbl. of load oil and 12 bbl. of new oil in 15 hours.

**Garfield County . . .** Erle P. Halliburton 1 Lukenbaugh in 19-21n-3w, has been scheduled

as a 6,200-ft. Wilcox sand wildcat. Sunray Oil Corp. and Mid-Continent Petroleum Corp. hold nearby acreage.

## KANSAS

### Sumner County Wildcat To Test Oil Shows

Beardmore Drilling Co. 1 Muehlenbrook, 3½ miles south of Milan in east-central Sumner County, ran production string for tests after recovering oil shows on two drill-stem tests.

Top of Lansing limestone was 3,294 ft., on elevation of 1,217 ft. First test was run between 3,465-94 ft., open 1 hour, which recovered 30 ft. of oil-cut mud, 60 ft. of gas-cut mud and 420 ft. of water. Second test, from 3,415-20 ft., developed 460 ft. of gas and mud-cut oil, plus 30 ft. of salt water. Flowing pressure ranged from 100-160 psi.

In Harper County, Pickrell Drilling Co. 1 Campbell flowed 20 bbl. of oil an hour through ½-in. choke and was waiting on potential test. The flow was from perforations in Mississippian lime at 4,368-88 ft. Top of the Mississippian was 4,363 ft., minus 2,810 ft.

**Pratt County . . .** Lario Oil & Gas Co. continued testing through perforations in the Viola and Simpson limes at 1 Earl Moore, wildcat 2 miles north of the new North Coats field.

A drill-stem test from 4,513-37 ft., open 1½ hours, developed 30 ft. of heavily oil and gas-cut mud and 410 ft. of oil and gas emulsion. Bottom-hole flowing pressure was 1,438 psi. Operators drilled ahead to 4,661 ft., ran casing and swabbed 5½ bbl. of oil in 4 hours from perforations at 4,512-18 and 4,520-34 ft. On elevator of 1,982 ft. the Lansing top was 3,964 ft., the Viola came in at 4,510 ft., and the Simpson at 4,515 ft.

## MICHIGAN

### New Shallow Oil Pool in Ottawa County Indicated

A new shallow oil-discovery well appeared to be assured as the Miller Brothers 1 Masselink, SW NE NW 28-5n-14w, in Zeeland Township, Ottawa County, flowed from the Traverse lime at a rate of 100 bbl. of oil per day through ½-in. choke. No water was evident. The well was reported strong enough to flow from 10 to 20 bbl. an hour through the chokes when on production.

Traverse lime, which checked from 10 to 20 ft. higher than correlating control points, was picked at 1,490 ft. Hole was bottomed out at 1,492 ft., with the well showing for 1,000 ft. of free oil, natural. On the basis of preliminary information, the discovery appeared to be the best in the southwestern area in many months.

Two follow-up tests are being rigged for immediate drilling. Miller Brothers are moving rig to the SW SE SW 21-5n-14w, the second 10-acre location north of the discovery, while Ford Oil Co. was scheduled to spud the north 10-acre offset to the discovery, in the NW NE NW 28-5n-14w.

The discovery is 2 miles northeast of a small producing area in the southwest corner of the township, and about 1 mile north and 2 miles east of Fillmore and Holland oil pools, Allegan and Ottawa counties.

## APPALACHIAN AREA

#### OHIO

After drilling two small gas wells, Willard Shrider et al have found oil in their third test in northwestern Jefferson Township, Coshocton County. Clinton sand at 3,381-3,423 ft., after fracturing, produced 398 bbl. of oil and 500,000 cu. ft. of gas in a 24-hour test.

Merle McCullough et al 1 A. B. Parry, Lot 15, ½ mile south of the new gas pool in the south central part of Clay Township, Tuscarawas County, filled 600 ft. with oil in 2½ hours and now is pumping 30 bbl. per day. Pay is in the second Berea zone at 980-984 ft.

The gas pool in Royalton Township, Cuyahoga County, was extended another ¼ mile to the west by Wiser Oil 2 John Zajicek, Section 15. Oriskany sand was logged at 1,715-1,771 ft., and gaged 820,000 cu. ft. of gas natural.

#### PENNSYLVANIA

In Parker Township, Butler County, southwestern Pennsylvanian, Walker et al, are building rig at 1 Walker, rank wildcat, Foxburg Quadrange, 2.78 miles south of latitude 41 degrees 05 minutes, and 2.94 miles west of longitude 79 degrees 40 minutes.

#### WEST VIRGINIA

Ten new locations were announced. Five were on the Hiram Anticline and four in Glade district, Webster County; and one in Middle Fork district, Randolph County.

In Glade district, Gregory Gas Co., made the four locations, all on the Cowen Quadrangle. They are: 1 T. C. McElwain, ele-


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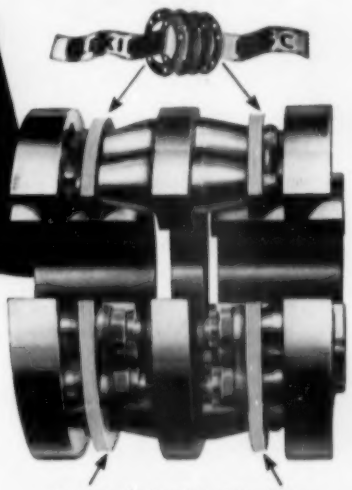

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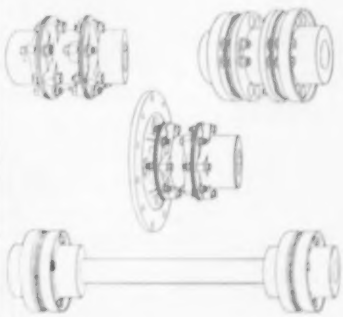

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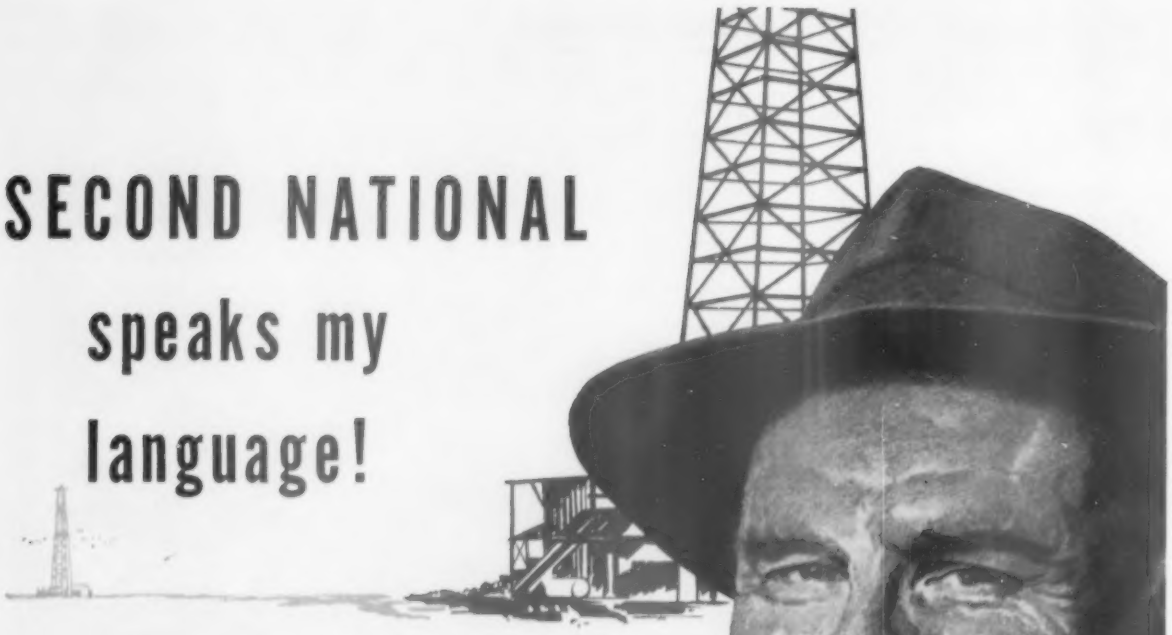

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vation 2,250 ft.; 1 L. E. Miller, elevation 2,300 ft.; 1 Henry L. Morgan, elevation 2,438 ft.; and 1 Dora Woods and Caddy Breamer, elevation 2,201 ft.

In Middle Fork district, the new location is Washington Natural Gas Co., 2 E. S. Newlon heirs, elevation 2,126 ft., on the

## CANADA

### Wildcat in Braeburn Area Discovers Third Gas Zone

Canadian Gulf Oil Co.'s wildcat in the Braeburn area of far-northwest Alberta, which was chalked up as a dual-zone gas discovery, has now been assured of gas production from the Permo-Pennsylvanian formation, and is a triple-zone gas strike.

This well, 16-19, LSD 16, 19-77-10w6, 28 miles east-southeast of Dawson Creek, flowed gas at rate 3,000,000 cu. ft. daily from the Cadomin formation; ran several tests in the Triassic and yielded gas at rates of more than 5,500,000 cu. ft. daily; and also produced at rates above 5,500,000 cu. ft. per day during one of two reported Permo-Pennsylvanian tests.

Permo-Pennsylvanian was entered about 7,250 ft., or 4,612 ft. subsea (K. B. elevation 2,638 ft.). During initial drill-stem test, from 7,250-61 ft., was reported to have flowed gas in 4 minutes, at the rate of 120,000 cu. ft. In latest reported test, from 7,260-72 ft. open 30 minutes, it flowed gas in 2 minutes, at the maximum rate of 5,570,000 cu. ft. daily. Coring and testing is being continued.

### New Gas Strike

A group of four Canadian companies has discovered a large gas flow in the basal Colorado sand horizon in the Wardlow-Steveville area, of southern Alberta, about 110 miles east of Calgary.

The new strike came at Steveville Development 6, LSD 7, 5-23-11w4, about ¾ mile west of Steveville Development 4, which discovered Viking oil last year, and ⅞ mile west-southwest of the first follow-up to that oil-strike, which failed to indicate oil production, but was completed as a capped Viking gas well. It is 8½ miles southeast of basal Colorado oil production, in the Cessford region.

Operators opened 17 ft. of basal Colorado sand, at 2,757-78 ft., and ran a 25 minute drill-stem test. Gas flowed immediately, blew the mercury out of the tube, and company engineers estimated flow rate at 8,000,000 to 10,000,000 cu. ft. daily. Casing is being run.

### Showings in Alsask Area

Phillips Petroleum Co. and Husky Oil & Refining, Ltd., have discovered a moderate flow of gas in Cretaceous sand in the Alsask area, southwestern Saskatchewan, about 4 miles east of the Alberta border.

This new strike, at 1 Alsask, LSD 10, 7-28-28w3, is 2¾ miles east of Alsask, 2½ miles south of the team's 1 Merid abandonment, and 8½ miles southwest of the Husky-Phillips 2 Marengo Viking-sand gas well. Cretaceous was entered at 2,450 ft., or 197 ft. subsea (K.B. elevation 2,253 ft.), and drill-stem-tested at 2,468-80 ft. for an hour. Gas flowed, in 7 minutes, at the rate of 1,750,000 cu. ft. daily for 10 minutes. Mud sprayed in 35 minutes, and clean gas flowed at the rate of 1,300,000 cu. ft. daily in 55 minutes. Later test, at 2,479-85 ft., after 1 hour recovered 65 ft. of mud and gas-cut mud and salt water. Drilling is below 2,904 ft.

### New Discovery Indicated

An oil showing in the form of oil-flecked mud, with salt water, was recovered during drill-stem test at Canadian Devonian Petroleum, Ltd.'s, wildcat in the Gull Lake area, southwestern Saskatchewan. This noncommercial showing came in what is believed to be the basal Cantuar sand-section of the Blairmore. The well is drilling to its main objectives in the Jurassic.

Showing was at Canadian Devonian 1 Carmichael, LSD 4, 35-12-20w3, 4½ miles west of the Anglo-Gridoil jointly-owned oil wells in South Gull Lake pool, 30 miles northwest of Shaunavon, and 40 miles southwest of Swift Current. Operators entered the Blairmore at 3,380 ft. and drill-stem-tested at 3,585-95 ft. for 45 minutes. There was a fair blow, decreasing to a weak blow. Pipe recovery consisted of 90 ft. of oil-flecked mud and 2,900 ft. of salt water.

## KENTUCKY

#### EASTERN KENTUCKY

In Big Sandy gas field, Kentucky-West Virginia Gas Co. has completed 6,171 Lewis Adkins, on Rockhouse Creek, in Pike County, for a natural open-flow potential of 2,040,000 cu ft. of gas daily. Producing formation is


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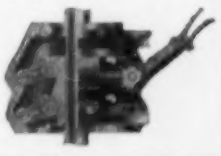

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the Mississippian Big Lime at 2,276-2,639 ft., total depth.

Also, in Pike County, the same company completed 6201 William Johnson, on Long Fork, for 4,950,000 cu. ft. of gas daily from the Big Lime at 2,315-70 ft. Total depth is 2,373 ft.

## LOUISIANA

### SOUTH LOUISIANA

### New Fault Block Opened In Bourg Multi-Pay Field

Another gas-condensate horizon and a new fault block were opened the past week in the multiple-pay, widespread Bourg field, which straddles the Terrebonne-Lafourche parish line 10 miles southeast of Houma.

They were opened by Arkansas Fuel Oil Corp. at its 1 LeCompte, which flowed at the rate of 6,000,000 cu. ft. of gas daily through ¼-in. top and bottom chokes with condensate recovery estimated at 18 bbl. per 1,000,000 cu. ft. of gas. Pressures gaged 4,100 psi. flowing, and 4,550 psi. shutin.

The new pay is designated as the "R" sand of middle Miocene age. Producing interval is at 11,466-76 ft. Hole was drilled to 11,859 ft.

The new fault block is adjacent to the southwest portion of the field, on the Terrebonne Parish side. The well, Arkansas Fuel Oil Corp.'s first drilling venture in the Bourg area, is in 28-17s-18e, on a 1,000-acre lease block, and is 3,100 ft. from nearest production.

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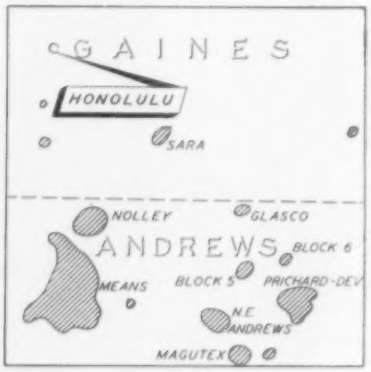
## TEXAS

### WEST TEXAS

### Another Gaines County Wildcat Shows Oil

A new deep structure was in prospect for southeastern Gaines County. Honolulu Oil Corp. 1 Mrs. C. H. Wescott, 6 miles southeast of Seminole and about the same distance northwest of the new Sara-Devonian field, has had three successful drill-stem tests in the Pennsylvanian, in addition to recovering oil from the San Andres and the Wolfcamp. Location is in Section 2, Block C-44, PSL Survey.




The Pennsylvanian drill-stem tests were: From 10,189-10,240 ft., open 4 hours, recovery was water blanket and 4,990 ft. of free oil. Flowing pressure reached 2,080 psi.

Drill-stem tests in the Pennsylvanian were all run with 1,000 ft. of water blanket. These were: From 10,189-10,240 ft., open 4 hours, gas surfaced in 50 minutes, and recovery was water blanket plus 4,990 ft. of free oil. Flowing pressure reached 2,080 psi.

Second test was from 10,199-10,240 ft., open 4 hours. Recovery was the water blanket and 4,990 ft. of oil and 10 ft. of mud.

At this writing, the last test also included salt water. The tool was open 6 hours between 10,234-10,269 ft., and recovery was 3,590 ft. of oil, 850 ft. of oil-cut water blanket, 150 ft. of oil, gas and salt water-cut water blanket, and 30 ft. of mud-cut salt water.

**Midland County . . .** Forest Oil Corp. and Cities Service Oil Co. 1 Dora Roberts "C-4," first test on the Dora Roberts Ranch in southwestern Midland County, has had oil shows in the Ellenburger. Location of the well is a southwest extension to the Warren-Pennsylvanian field discovery.

First drill-stem test in the Ellenburger, from 13,067-13,133 ft., recovered 84 ft. of slightly oil and gas-cut mud. Operators then swabbed oil and gas-cut mud from open hole from 13,055-13,233 ft., with no estimate on recovery.

Forest and Cities Service have announced location for a new 13,500-ft. wildcat, to be drilled as 1 Fee "46," located in 46-41-T3S-T&P Survey, two locations south of 1 Dora Roberts C-4.

### NORTH TEXAS

### Nolan County Strike Gaged

Humble Oil & Refining Co. 1 Petty, Ellenburger discovery north of E. A. Cambrian field in Nolan County, has been completed

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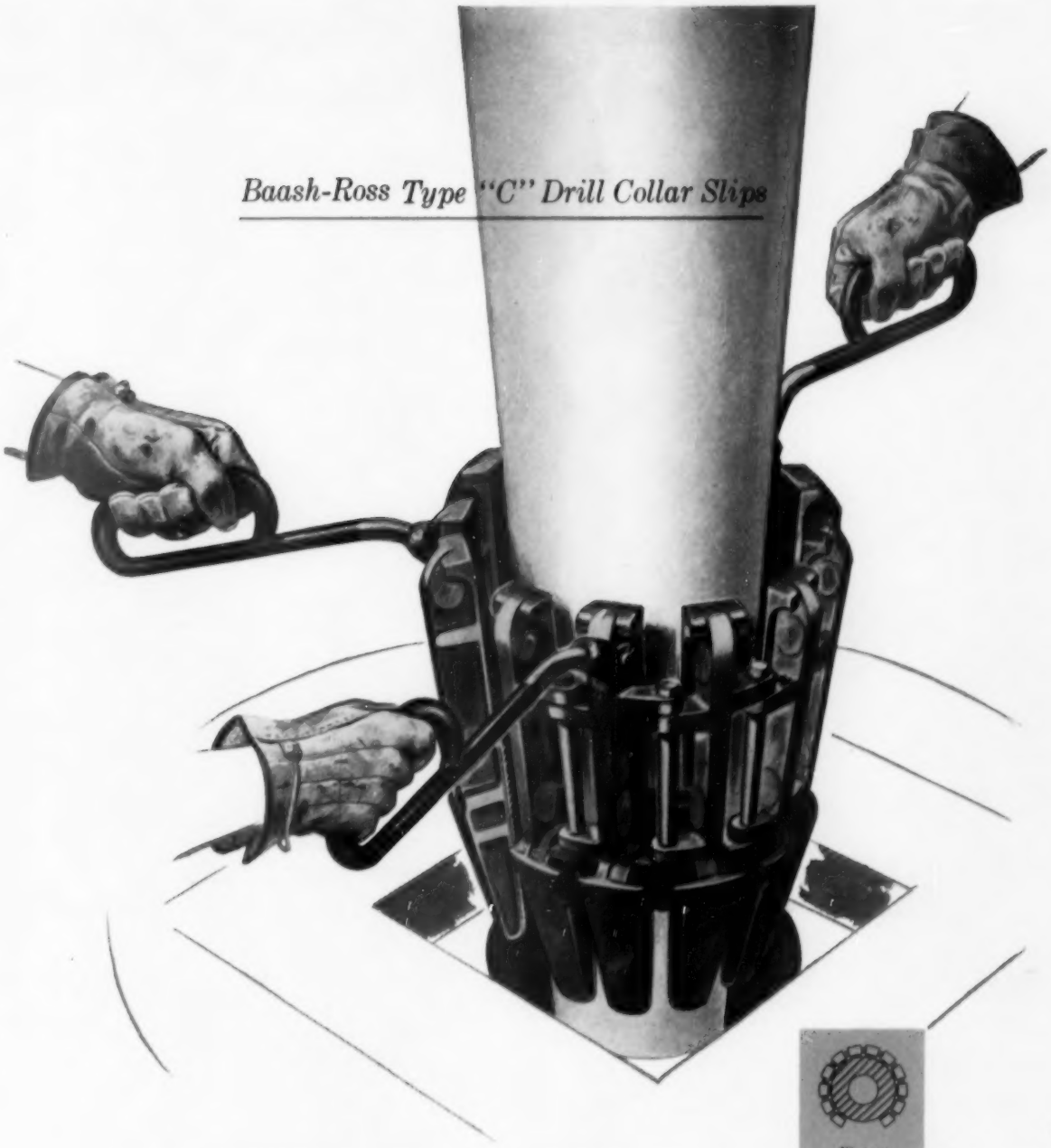

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for a daily flowing potential of 170 bbl. of 43° oil. Production was through 9/64-in. choke, from open hole between 6,085-6,138 ft. Gas-oil ratio was 425 cu. ft. and flowing tubing pressure was 335 psi.

Clarence L. Norsworthy 2-A Nita Mae Brooks, about 6 miles northwest of E. A. Cambrian field, developed oil shows in what was thought to be Ellenburger dolomite. A 2-hour test was run from 6,914-30 ft., which recovered 300 ft. of fluid, half oil and half mud. Shut-in pressure was 1,000 psi. in 15 minutes. The project was originally drilled dry to 6,285 ft.

**Callahan County . . .** Rhodes Drilling Co. and Texas Crude Oil Co. 1-A Dyer, originally drilled dry to 1,847 ft. as Halbert 1-C Dyer, completed as a Gardner sand discovery. Completion potential from perforations at 3,858-62 ft. was 218 bbl. of 42° oil a day through 15/64-in. choke. Gas-oil ratio was 1,247 cu. ft. Location is 5 miles northwest of Clyde.

New Flippen sand oil was in prospect at Robert, King, Ford and Travis Drillers 1 Dugan, wildcat 5 miles north of Clyde. A drill-stem test in Flippen sand from 1,594-1,607 ft. recovered 30 ft. of oil and gas-cut mud, 100 ft. of heavily gas-cut mud and some free oil. A second test between 1,600-32 ft. established the water level. Earlier tests in the Tannehill at 1,505-37 ft. developed 30 ft. of oil and gas-cut mud in 1 hour.

EAST TEXAS

## Deep Collin Test is Dry

Humble Oil & Refining Co. prepared to abandon its 1 Miller in Leonard Searcy Survey, 3½ miles west of McKinney. Total depth was 11,407 ft. Very few details had been released at this writing, and the lowest marker carried on field reports was the Travis Peak at 2,562 ft. An oil show was reported while drilling around 9,400 ft. but later perforations and acid treatments covering that section failed to develop any shows.

**Gregg County . . .** Lone Star Producing Co. 1 Culver, 1-mile southwest outpost to production in Willow Springs field, had a show of oil and gas in the Travis peak and was running casing to test. A drill-stem test in the Travis Peak from 7,428-7,528 ft. flowed gas at the rate of 942,000 cu. ft. daily and recovered 225 ft. of distillate-cut mud. Completion tests will be made near that interval.

## Anderson County Has Woodbine Prospect

Shows of gas and distillate from the Woodbine have been reported at Christie, Mitchell & Mitchell 1 Nora Langston, Anderson County wildcat located 4 miles south of Slocum.

Operators topped the Woodbine at 5,962 ft. on elevation of 759 ft. and ran a 35-minute drill-stem test covering the first 4 ft. of the sand. Recovery was water cushion and 90 ft. of dark, high-gravity distillate. Surface gas pressure built up to 1,675 psi.

Location of the well is 1 mile southwest of Signal Oil & Gas Co. 1 Carnes, Woodbine failure which had good shows of oil in the Woodbine, but made salt water on drill-stem tests of that formation.

SOUTHWEST TEXAS

## Oil Discovery Completed

Phillips Petroleum Co.'s new oil-discovery well, 3 Key, in John Smith Survey, southern San Patricio County, 9½ miles northwest of Corpus Christi, has been completed with a flow of 52 bbl. of 22.1°-gravity crude per day through ⅛-in. choke at 200-psi. pressure with gas-oil ratio of 250 cu. ft. per barrel. Pay interval is 4,006-16 ft. in hole drilled to 6,616 ft.

## Duval Wildcat Flows Gas

A dry-gas discovery, located 12 miles northwest of Freer, in Duval County, has been made by J. W. Gorman and associates at their 1 Sidney Adami, in Arnold & Barnett Survey 47. Although no productivity estimates have been reported, flowing pressures of the discovery well gaged 775 psi. on ¼-in. choke, and 820 psi. on ⅛-in. choke. Pay is in sand-interval at 2,018-30 ft. with bottom of the hole at 2,175 ft.

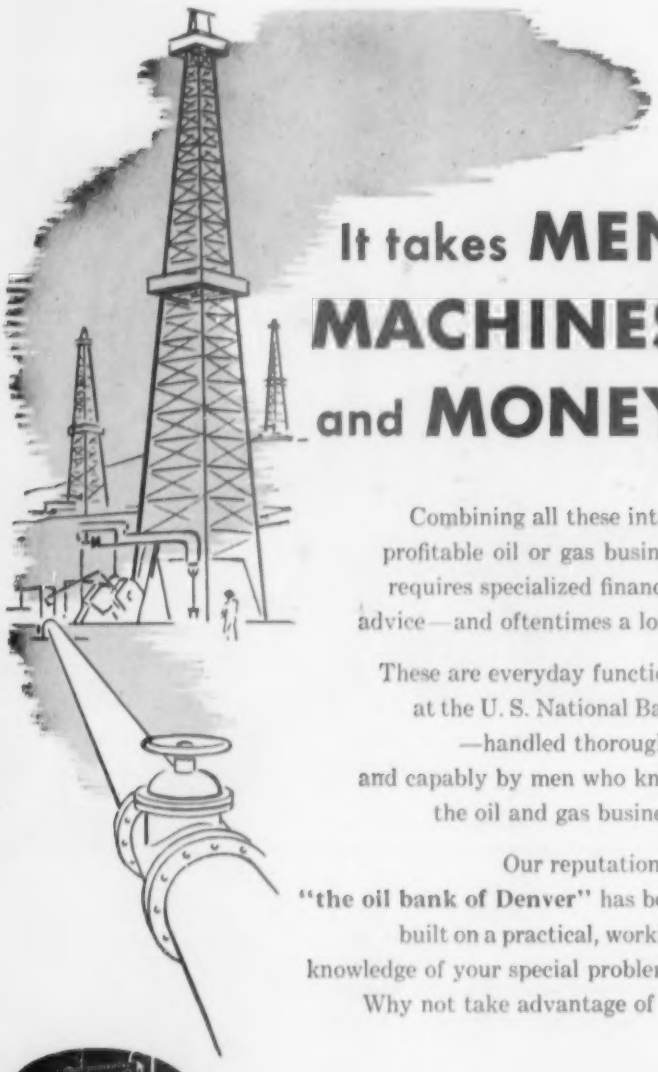
## New Nueces Oil Strike

A new oil-producing area has been opened 5 miles southwest of Robstown, Nueces County. Discovery well, Edwin L. Cox 1 Davis, flowed 84 bbl. of 34°-gravity oil in 24 hours on potential gage through ⅛-in. choke with 550-psi. pressure and gas-oil ratio of 701 cu. ft. per barrel. Pay zone is perforated at 5,775-79 ft. Total depth is 5,962 ft. Location is 2 miles west of Minnie Bock field.

TEXAS GULF COAST

## Gas Found in Raisin Area

Currie B. Davis and associates have a new gas discovery in the Raisin area, Victoria County, where their 1 Billo, in John Chewers Survey, is being completed in Frio sand, perforated at 3,472-75 ft., with bottom of hole at 4,403 ft. Gas is dry, flowing through ¼-in.

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choke while cleaning with 1,350-psi. pressure. Location is 2½ miles northwest of Raisin, and just south of Coleto Creek, near the Goliad County line.

## Deeper Horizon Uncovered In New Raywood Producer

Discovery of a deeper producing horizon in the Raywood area, of Liberty County, is indicated by preliminary tests made by General Crude Oil Co. in its 4 Morris et al, the company's fifth test in the area.

Although there is no gage of productivity so far, the well flowed gas and condensate while cleaning out after perforating sand-interval at 11,853-63 ft. It has been shut in pending potential tests and a connection. Total depth is 12,483 ft., with casing at 12,426 ft.

The area was opened for production in March 1953. Discovery well, the area's second test, was completed in Cook Mountain sand at 11,247-49 ft. It was followed with another well from the same horizon at 11,391-454 ft., and more recently with a Vicksburg well at 7,563-66 ft. The area's initial test was abandoned after a blowout while drilling at 10,887 ft.

## Hutchins Gas Pay Spreads

Gas production in the Hutchins area spread southwestward with completion by Johnson & Appling of their 1 Kainer Unit, in the IRR Survey, flowing at the rate of 12,200,000 cu. ft. of gas daily from sand at 5,791-93 ft. Flow carried a good spray of 45.5°-gravity condensate, with gas ratio of 207,000 cu. ft. per barrel. The well, shut-in with pressure of 2,205 psi., is 1,240 ft. from nearest production, Lloyd H. Smith 1 Johnson, completed in sand-interval at 5,839-41 ft.

## Sub-Clarksville Horizon Produces at Madisonville

Sub-Clarksville has been found productive of gas and condensate in a new well completed by J. M. West in the North Madisonville area, 7 miles west of Madisonville, in Madison County.

The well, 1 Poteet et al, in the Artec Crownover Survey, is rated good for 1,610,000 cu. ft. of gas per day on open flow with pay at 8,222-38 ft. in open hole, bottomed at 8,272 ft. Condensate yield is at the rate of 1 barrel to 38,300 cu. ft. of gas. Gravity is 56.3°. Shut-in pressure of the well is 2,887 psi.

Location of the well is 2,750 ft. northwest of a Woodbine oil producer at 8,600 ft.

### TEXAS PANHANDLE

## Three-Mile Extension of Hitchland Area Indicated

Promising oil and gas showings have been encountered in another Hansford County wildcat, United Producing Co. 4 Lola Jackson, located 3 miles southwest of production in the rapidly developing Hitchland field, opened early this year by Humble Oil & Refining Co.

Showings were in Douglas (Pennsylvanian) sand, in which an 80-minute drill-stem test at 4,656-76 ft. got gas to the surface in 10 minutes, flowing at the rate of 312,000 cu. ft. per day, and recovered 360 ft. of heavily oil and gas-cut mud.

Showings have been passed up for the time


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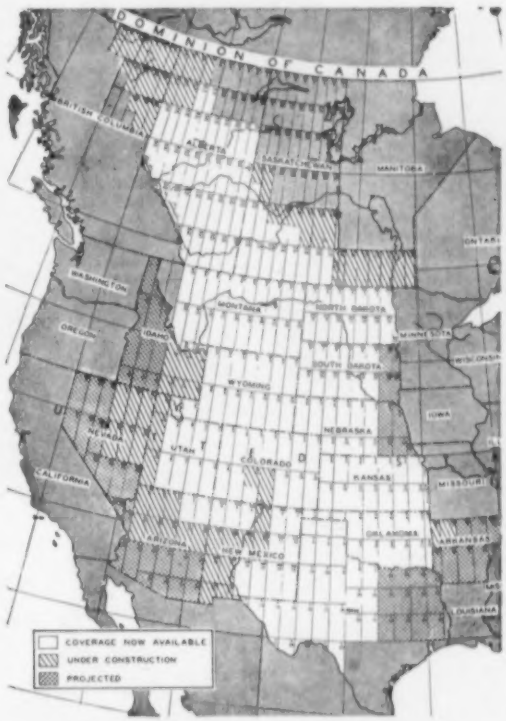


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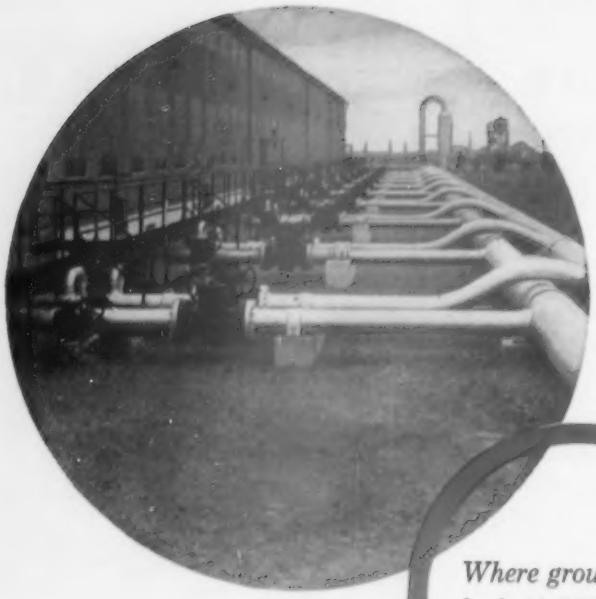

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being with hole being deepened to the Morrow, and possible deeper horizons. Both Douglas and Morrow sands have been found productive at Hitchland.

Production at Hitchland has been extended 2 miles to the northeast with completion by Humble of its 1 Hitchland Gas Unit 2, rated good for 136 bbl. of 39.6°-gravity net oil per day, flowing through ¼-in. choke. Pay is Douglas sand, in open hole at 4,531-40 ft.

## New Oil Producer Revives Old Cockrell Ranch Area

New interest is being directed to the old Cockrell Ranch area, in southeastern Hutchinson County, following completion by Warren-Bradshaw Exploration Co. of a good producer at its 1 Cockrell, an outpost well in Section 3, Block 23, BS&F Survey.

Testing the area's brown dolomite pay zone, logged at 2,889-3,115 ft., the well flowed 754 bbl. of clean oil in 24 hours.

Location, 6 miles southeast of Borger, adjoins an old sector of the field, in which early wells had initial flows up to 7,000 bbl. daily.

## Production Tests Slated In New Morrow Discovery

The Texas Co. has run oil-string for production tests in its 1-A Pearson, indicated Morrow discovery-well, 9 miles south of Waka, southwestern Ochiltree County, in the north part of Texas Panhandle.

Possible Morrow production was indicated in previously reported drill-stem tests, one at 7,431-43 ft., and the other at 7,554-73 ft., in which substantial gas flows were made with recoveries of gas-cut mud.

Since these tests, hole has been drilled to 10,187 ft. Two drill-stem tests were made near bottom, one at 10,010-97 ft., getting 120 ft. of oil and gas-cut salt water with some free oil, and the other at 10,080-187 ft., getting salt water.

Location is 9 miles southeast of the company's 1 Blakemore, Morrow gas-discovery well, in Hansford County, completed early this year, and 8 miles northwest of its 1-B McGarraugh, Atoka oil-discovery well.

**Carson County test . . .** Pure Oil Co. has announced location for a 6,000-ft. wildcat to be drilled near the center of a 7,000-acre block in southwestern Carson County. The project will be 1 N. H. Read, located in Section 26, Block B4, H&GN Survey, which is 3½ miles northeast of Washburn and 19 miles southwest of production in the Panhandle field.

**Hansford County . . .** Locations for one exploration test and three pool wells in a newly opened area have been announced. The wildcat is to be drilled by Clark, Roark, Hooker & Hill as 1 P. F. Hawkins, in 3-5T-T&NO Survey, 10 miles southwest of Hansford. Projected depth is 7,500 ft., with the Mississippian as its goal.

R. H. Fulton, Amarillo, has started two 7,200-ft. outposts to the north and west of his 1 Mathews, recent Morrow sand gas discovery in the east-central part of the county. Fulton 2 Mathews is in 104-45-H&TC, ¾ mile north of the discovery, and Fulton 1 Jackson in 114-45-H&TC, is ¾ mile to the west.

Stanolind Oil & Gas Co. has entered the new area with 1 L. W. Mathews in SE NW of Section 117.

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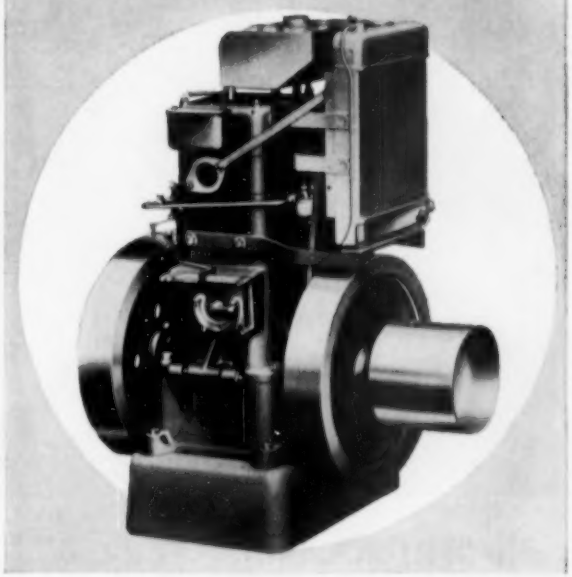

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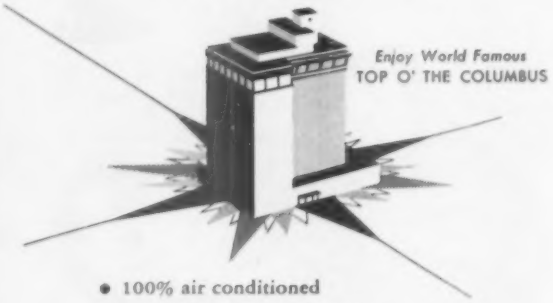


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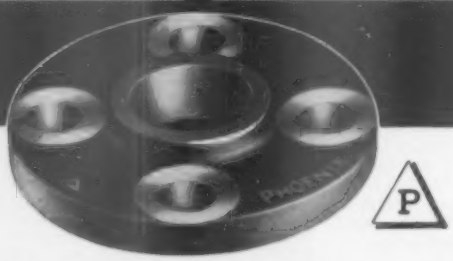

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## ROCKY MOUNTAIN

### NEVADA

Shell Oil Co. reported recovery of 158 bbl. of net oil per day on swab at 1 Unit, SE NE NW 35-9n-57e, in the Eagle Springs area, Nye County. The operator drilled to 10,358 ft. and plugged back to 6,730 ft. Casing was landed at 6,450 ft., and open hole acidized with 2,000 gal. Acid was displaced with oil, and the first 24-hour swab test recovered 218 bbl. of fluid, of which 158 bbl. was new oil.

Gravity of production was reported at 19°, wet. Shell has moved off rig and is preparing to install pump.

The well is Nevada's first apparently commercial producer. Shell has two additional locations staked, but has not started operations on either of them.

### IDAHO

Rocky Mountain Oil Corp. has resumed operations and is drilling below 1,250 ft. at 1 Government, NW SW NW 30-12s-46e, in the Giveout area, Bear Lake County. The well was drilled to 966 ft. with cable tools, and was suspended. It now is under rotary rig, and will test Nugget about 5,000 ft.

### ARIZONA

Shell Oil Co. has made location for its second well in the East Boundary Butte area of Apache County. The well is 2 East Boundary Butte, C SE NW 3-41n-58e. Initial drilling in this area by Shell was temporarily abandoned earlier this year, after shows in Hermosa (Pennsylvanian) which were thought possibly commercial, prior to running of casing and complete testing.

### COLORADO

Miracle and Fifer recovered 4,130 ft. of oil in 1 hour for an apparent "D" sand discovery at 1 Monroe, NE NE NW 10-8n-53w, Logan County. Test was in the zone at 4,795-4,802 ft. There was a small gas blow in 11 minutes. Pipe recovery included 270 ft. of water. Flowing pressure was 220-700 psi. Operator cored 4,792-4,821 ft. and recovery included 13½ ft. of saturated sand. The operator is waiting on completion rig with total depth at 4,791 ft.

H. C. Arnold tested "D" sand at 5,310-26 ft. at 1 State, C SW NE 11-7n-55w, Logan County, and recovered gas at the rate of 5,000,000 cu. ft. per day. Tool was open 30 minutes, and recovery in pipe was 10 ft. of distillate and 60 ft. of fresh water. Operator drilled to 5,535 ft., total depth, and is still testing. The apparent discovery is about 2 miles northwest of produtcion at Sand Creek field.

Aurora Gasoline Co. and Kingwood Oil Co. recovered gas at the rate of 5,000,000 cu. ft. per day, estimated, on test of 1 Lauck, SW SW NE 25-3n-58e, northwest of Adena field, Morgan County. Test was of the "D" sand interval at 5,524-60 ft. Flowing pressures ranged from 535 to 1,020 psi. Recovery of 90 ft. of oil and 180 ft. of water was reported on reverse circulation. The well is 4 miles south of Fort Morgan, with failures intervening between it and Adena.

S. D. Johnson, Denver, has completed 1 Lind-Bacon, C SW SW 19-3n-57w, Morgan County, for a flow of 2,000,000 cu. ft. of gas and 40 bbl. of distillate per day. The well produced from "D" sand at 5,542-44 ft. It is east of Adena field. Gas production east of the field already had been established, but this discovery is far east of previous gas producers.

Sinclair Oil & Gas Co. has made location


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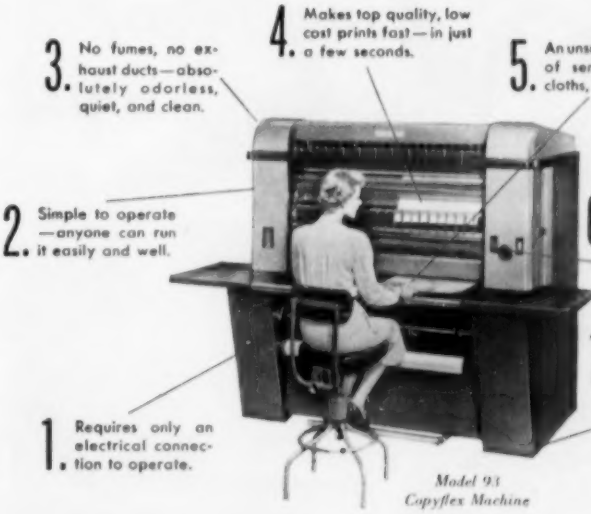
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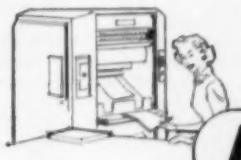

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for 1 Taylor, NE NE SW 3-18s-63w, Elbert County. Location is about 3 miles east of Kiowa. There has been only one previous drilling in the area, a failure at 7,508 ft. about 3 miles east of the Sinclair location.

### NEBRASKA

Carmack Drilling Co. will run casing at 1 Stauffer, SW SW SE 34-19n-55w, Baner County. The operator cored 11 ft. of saturated "J" sand in the interval at 5,825-58 ft. Drill-stem test of the zone failed due to packer trouble, and the operator has run logs and will set casing. A drill-stem test of "D" sand, also classified as not successful, recovered some shows, with completion in that formation considered possible but not likely.

### WYOMING

Irving Pasternak, Denver, has made location for two 10,000-ft. tests to the Shannon in the Powell area of Converse County. The operator will drill 1-A Government, C NW NW 31-40n-73w, and 1-B Government, C NW SE 10-39n-73w. Both are on farm-out from Union Oil Co. of California.

Union completed a small discovery in Sussex sand at 1 Unit, W½ SE SE 29-40n-73w, early this year. This well made 500,000 cu. ft. of gas and 40 bbl. of oil per day.

Sinclair Oil & Gas Co. tested gas at the rate of 4,600,000 cu. ft. per day at 1 Unit, SW SW SE 27-33n-95w, in Kirby Draw Unit, Fremont County. The well was drilled through Phosphoria and Tensleep but was plugged back for test of Morrison when only slight shows were found in the lower formations. Test of the zone at 5,536-52 ft. recovered the volume mentioned above. A previous test at 4,500-25 ft., in Frontier, recovered gas at the rate of 1,350,000 cu. ft. per day.

El Paso Natural Gas Co. and Continental Oil Co. recovered only gas-cut mud and water on test of Dakota at 1 Fontenelle Unit, W½ SE NW 11-24n-113w, Lincoln County, and are drilling ahead below 11,400 ft. Shows were cored in the interval at 11,298-11,348 ft. and test of that interval recovered 150 ft. of muddy water, 1,800 ft. of clear water, 450 ft. of gas-cut mud, 5,600 ft. of gas-cut water, and 30 ft. of gas-cut mud. Flowing pressure was 3,600 psi. A 3,000-ft. water cushion was used.

### MONTANA

Phillips Petroleum Co. and others have made location for 1 Harmond, C NW SW 29-27n-58e, in the Lakeside area, Roosevelt County. The well is a test to the Red River or Winnipeg, or both. Location is in the southeastern part of the county, which has had little previous drilling. It is 18 miles north of production at Brorson, in Richland County.

Pattie & Stewart recovered oil at the rate of 65 bbl. per hour on test of Moulton sand at 4 State, NE SW NE 7-37n-4w, in the Border area, Toole County. The well topped Moulton at 2,636 ft., and drilled 48 ft. of pay. Test was of open hole. The well is reported shut in. Previous potentials in this area have been 150 bbl. per day or less.

### SOUTH DAKOTA

First tests of Red River (Ordovician) at 1 Clark, NE NE 11-22n-2e, in the Fox Hills Dome area, of Harding County, recovered only water with a trace of oil. Stanolind Oil & Gas Co., the operator, will perforate and test a new zone in this formation. Initial tests were of the interval at 8,487-8,526 ft. The well had shows in cores and samples, and casing was set without benefit of drill-stem tests.

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## CALIFORNIA

### Union Completing Test In Lost Hills Area

Union Oil Co. is attempting to complete a wildcat northwest of Kern County's Lost Hills field as a discovery in the Etchegoin sand (middle Pliocene age). The wildcat, 63-29 Seaboard-Saunders, has combination 8⅝-in. pipe to 2,493 ft. with about 60 ft. of perforated liner in the string, cemented at 2,410 ft.

The prospective discovery is about 2½ miles northwest of Lost Hills, in SW NE 29-25s-20e. Results were not made available but a formation test around 2,500 ft. reportedly indicated commercial production. Drilling was halted at 2,567 ft. and hole then plugged back to 2,515 ft. The well originally was scheduled to drill to about 7,500 ft.

### Guijarral Hills Outpost Dry

Los Nietos Oil Co. failed in its effort to extend North Guijarral Hills' Leda sand production ½ mile north. The wildcat, 78-22 Guijarral Service in SE SE 22-20s-16e, has been abandoned at 8,923 ft. In Section 27, Standard Oil Co. of California has completed the "83" well flowing at a 1,500-bbl. daily rate and is in process of completing the "76" well.

In NE NE 4-21s-16e, L. A. Harnish, is

field survey reveals

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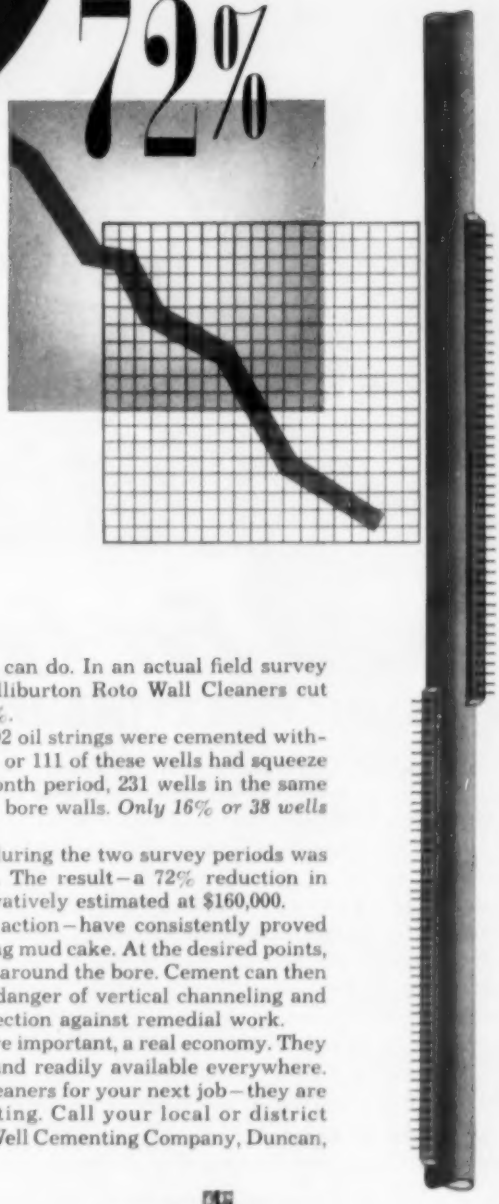

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preparing to drill 81 4H as a 1-mile southeast outpost to the Leda sand pool which 73 32F discovered last autumn in 32-20-16e. Four wells have been completed in West Guijarral Hills, all in SE NE 32 and SW NW 33. Two were by Harnish and two by Standard.

## Tejon Extension Test Coring Oil Sand

Reserve Oil & Gas Co. 32-34 Reserve-Pauly apparently will extend the company's recent new pool discovery at Tejon Ranch, extreme southern San Joaquin Valley, one location northwest. Originally abandoned at 4,926 ft., the test drilled into the Olcese sand (Miocene) at 5,624 ft. and was still in oil pay at 5,722 ft.

The extensioner is running slightly higher than the discovery, both of which are in NE NW 34-11n-19w. Reserve-Pauly 42-34, discovery well, was completed at 5,657-5,743 ft., flowing 29°-gravity crude through 17/64-in. choke at a 625-bbl. daily rate. Southeast of the discovery, Richfield Oil Corp. 53-34 Tejon-B is drilling below 2,000 ft.

## New Wheeler Ridge Play

Richfield Oil Corp. is to drill a deep test northeast of Wheeler Ridge production, southeastern San Joaquin Valley, where the company has increased its holdings about 4,200 acres. The new block, obtained from Kern County Land Co., includes all or portions of Section 13, 14, 15, and 21 through 28. Since Standard Oil Co. of California already has shallow production in Sections 27 and 28, Richfield apparently acquired deep rights only in those two sections.

## WILDCAT COMPLETIONS

### SOUTHWEST TEXAS

**District 1**

Atascosa County: Bowman Cattle Co. 1 Coward, El Paso Irrigation Co. Sur. 91, A-239. Dry. TD 5,017 ft.

Drilling & Exploration, Inc., 1 Davis, AB&M Sur. 115, A-55. Dry. TD 4,648 ft.

LaSalle County: O. N. Beer 1 Harris, I&GN Sur. 40, Block 1, A-424. IP 55.29 BOPD, 9/64-in., 41.7°, perorations 3,756½-59½ ft. TD 3,830 ft. (New field — Los Angeles.)

Wilson County: Foams Oil Co. of Texas 1 Smith, Block 39, Seguin Subd., S. & J. Arocha Sur. Temporarily abandoned. TD 395 ft.

L & N Oil Co. 1 Dennis, Maria Calvillo Sur. 22, A-5. Dry. TD 640 ft.

**District 4**

Aransas County: Sam E. Wilson, Jr., and Jay Callahan 1 Ocker Brothers, Lot 17, Block 3, C. B. Lucas Subd., M. J. Ximenes Sur., A-224. IP 6,000 M.c.f. daily, open-flow potential, perforations 7,442-48 ft. TD 10,051 ft.

Brooks County: Carrl Oil Co. and Shore Exploration Co. 1 Perez, Share 13, La Enchantada Grant. Dry. TD 7,322.

Jim Wells County: H. H. Howell et al 2 Knolle, Lot 6, Gallagher Subd., Casa Blanca Grant, A-296.

S. H. Howell 1 Patterson, H. L. Delamer Sur. 144, A-125. Dry. TD 5,520 ft.

San Patricio County: Goldston Oil Corp. 1 Willis, Section 6, George H. Paul Subd., Coleman Fulton Pasture, W. B. Blanchard Sur. 8, A-77. Dry. TD 9,015 ft.

John D. Hawn et al 1 J. F. Welder heirs, Victoriana Tares and Pedro Villareal Sur., A-32. Dry. TD 8,624 ft.

Starr County: Sun Oil Co. 4-A Coates-State, Francisco Alverado Grant 516. IP 153.51 BOPD, 9/64-in., 43.4°, Vicksburg 6,862-72 ft. (perforations). TD 7,000 ft. (New oil pay in North Rincon field).

Webb County: G. G. Mortimer, Jr., 1 Billings trust, CCSD&RGND Sur. 38. Dry. TD 2,466 ft.

Harry E. Murray 1-A Withers, G. B. Withers Sur. 52. Dry. TD 1,404 ft.

Interstate Minerals, Inc., 74 Lopez, CL Lots 4 and 5, Sur. 113. Dry. TD 1,826 ft.

### TEXAS GULF COAST

**District 2**

Bee County: Henshaw Brothers and K. D. Harrison 1 Brauer et al, John Ryan Sur., A-63. Dry. TD 4,359 ft.

Colorful, Durable
DECALS
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*Some of Our Customers Report Savings as High as 70%!

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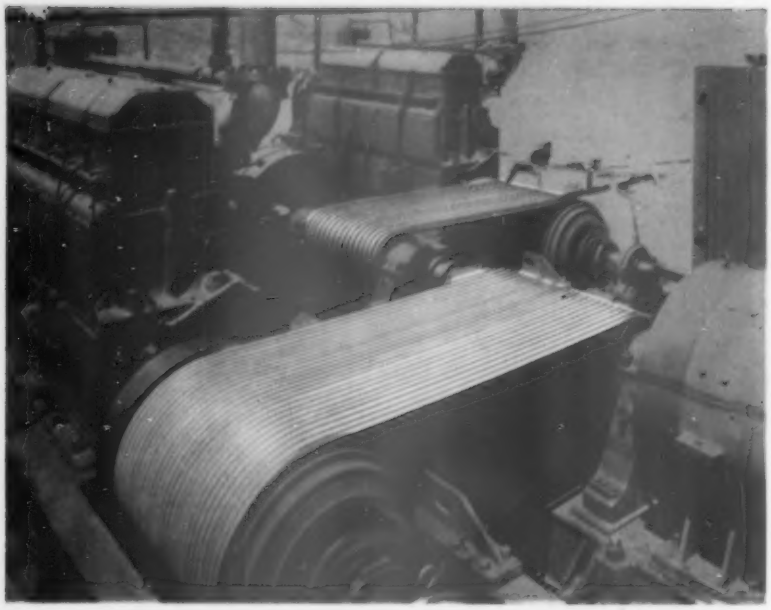

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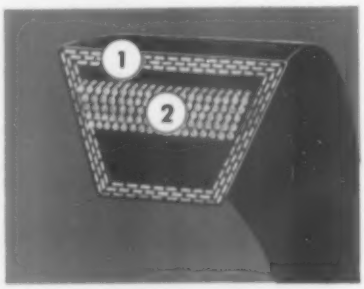


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**Dayton Rubber**

*Since 1905* ©D. R. 1954

***World's largest manufacturer of V-Belts***

## WILDCAT COMPLETIONS

Pronto Drilling Co. 1 Sanders, James Hefferman Sur., A-31. Dry. TD 3,552 ft.

Jackson County: V. A. Brill 2 LaBauve, Josiah H. Bell Sur., A-7. Dry. TD 8,270.

Harrell & Southworth 1 Jones et al, I&GN Sur., A-180. Dry. TD 4,797 ft.

Magnolia Petroleum Co. 1-B Robinson, Jessie Wilson Sur., A-86. IP 42,000 M.c.f. daily, open-flow potential, perforations 3,912-18 ft. TD 4,818 ft. (New field).

### District 3

Brazoria County: C. B. Wrightsman 1 George, George Tennille Sur., A-131. Dry. TD 10,596 ft.

George R. Brown 1-G Ramsey State Farm, S. F. Austin Sur. 9, A-25. IP 23,000 M.c.f. daily, open-flow potential, Frio 6,600-05 ft. (perforations), and 36,000 M.c.f. daily, open-flow potential, Miocene 5,090-5,100 ft. (perforations). TD 8,433 ft. (New pays in South Lochridge field.)

Colorado County: Southern Minerals Corp. 1 Mott et al, I&GN Sur. 23, A-281. Dry. TD 9,448 ft.

Harris County: Jack W. Frazier 1 Allison-Minnetex unit, William Lovett Sur., A-526. IP 312.67 BOPD, 12/64-in., 26.6°, Frio 4,850-53 ft. (perforations). TD 4,870 ft. (New segment and new pay in Mykawa field.)

Ginther, Warren & Ginther 1 Taub estate, Amos Barber Sur., A-125. Dry. TD 8,012 ft.

Jefferson County: Meredith & Co. and San Juan Exploration Co. 1 Leger, S. Dean Sur., A-16. Dry. TD 8,015 ft.

Carnes W. Weaver and Hurt Oil Co., Ltd., 1 Nona Mills, C. Hillebrandt Sur., A-28 (North Lovells Lake area). Dry. TD 7,515 ft.

Liberty County: Texas State Drilling Co. 1 Price Daniel, Joseph Dunman Sur., A-32. Dry. TD 6,521 ft.

Matagorda County: Union Producing Co. 1 State-East Matagorda Bay, Tract 77, Matagorda Bay (Dressing Point area.) Dry. TD 7,500 ft.

Montgomery County: Magnolia Petroleum Co. 1 Chase National, D. Garrett Sur., A-225. IPP 50 BOPD, 34.5°, perforations 9,188-96 ft. TD 12,276 ft. (New field.)

Morris K. Womack 1 Hunt et al, William Hobday Sur. Dry. TD 6,381 ft.

Superior Oil Co. 1 Sykes, William Weir Sur., A-42. IP 132 BCPD and 2,060 M.c.f. daily, 16/64-in., 53.5°, perforations 11,198-210 ft. TD 13,100 ft. (New field.)

Wharton County: Progress Petroleum Co. of Texas 1 Olson, Jauquin Rendor Sur. 5, A-320. Dry. TD 5,707 ft.

### EAST TEXAS

Anderson County: General American Oil Co. 1 Caldwell, John C. Ogden Sur., A-594. Dry. TD 4,950 ft.

Morris K. Womack 1 Ellis, Jose Pinedo Sur. Dry. TD 5,638 ft.

Cherokee County: Donald Bolls 1 Johnson, G. B. Hill Sur., A-367. Dry. TD 5,110 ft.

Stroube & Stroube 1 Roosth & Genecov, J. M. Fitzgerald Sur., A-291. Dry. TD 5,017 ft.

Trans-Tex Drilling Co. 1 Zink, J. W. Love Sur. Dry. TD 5,122 ft.

Fannin County: H. Houston 1 Scott, S. K. Blish Sur. Dry. TD 1,954 ft.

Hunt County: B. B. Banner 1 White, E. Mitchell Sur. Dry. TD 3,130 ft.

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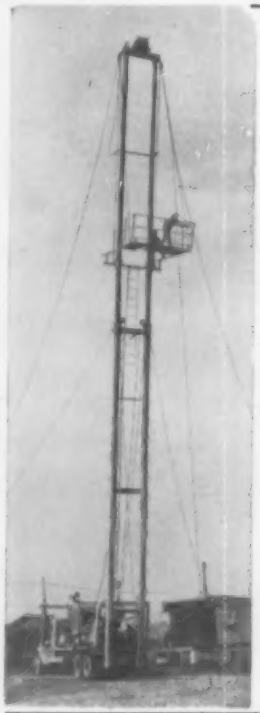

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S & R TOOL & SUPPLY CO. — HOUSTON, TEXAS

## WILDCAT COMPLETIONS

Kaufman County: Pat Coon 1 Coon fee, Lewis Pearce Sur. Dry. TD 2,741 ft.

Van Zandt County: Bolls, Jackson and Graves 1 Fowler, John Hanks Sur., A-339. Dry. TD 5,228 ft.

### TEXAS PANHANDLE

Carson County: Roark-Hooker-Hill & Clark 1 Rohan, 31-B4-H&GN. Dry. TD 7,030 ft.

Hutchinson County: Gulf Oil Corp. 1 Amarillo Bank-Wisdom Unit, 8-M3-TCRR. Dry. TD 8,284 ft.

### WEST CENTRAL TEXAS

Callahan County: Ned C. Butler 1 Rogers, Sec. 87, BBB&C Sur. Dry. TD 2,246 ft.

Coleman County: Kewanee Oil Co. 1 Mayo, Lot 6, Burnett CSL Sur. 703. Dry. TD 3,293 ft.

Tommy Vaughn 1 Parker, Bradford Fowler Sur. 485. Dry. TD 2,074 ft.

C. L. Yeatman and W. I. Nowlin 1 Quinn, Blk. 4, D. A. Murdock Sur. 738. Dry. TD 2,500 ft.

Eastland County: Trumter Petroleum Co. 1 Hyatt, 87-3-H&TC. Dry. TD 1,523 ft.

Fisher County: Chicago Corp. 1 Schluter, Subd. 12, Gillespie CSL Sur. 305. Dry. TD 6,590 ft. Elev. 2,061 ft., Ellenburger 6,530 ft.

Jones County: W. P. Carr 1 Myatt, Sec. 72, J. Douglass Sur. Dry. TD 2,046 ft.

Texas Pacific Coal & Oil Co. 1 Parham, J. M. Cloud Sur. 269. Dry. TD 4,965 ft.

Palo Pinto County: B & R Oil Co. 1 Cone, 9-2-T&P. Dry. TD 1,253 ft.

R. D. Hinkson 1 Hinkson, 71-3-T&P. Dry. TD 1,070 ft.

Nolan County: J. D. Wrather, Jr. 1 Franks, 184-64-H&TC. Dry. TD 6,285 ft. Elev. 2,280 ft., Ellenburger 5,820 ft., Hickory sand 6,259 ft.

Shackelford County: W. E. Butler 1 Moberly, Sec. 574, TE&L Sur. Dry. TD 4,194 ft.

Taylor County: J. B. Schick & Wayne Petroleum Co. 1 Bookerson, Mose Evans Sur. 111. Dry. TD 4,825 ft.

E. F. White, Jr. 1 Baland, 51-19-T&P. IP 212 BOPD, 24/64-in., 39°, TP 40 psi., GOR 500 cu. ft., Tannehill sand perforated 2,737-43 ft. TD 2,748 ft.

Throckmorton County: Hale Brothers 1 Anderson, Subd. 1, J. D. Wilson Sur., A-829. Dry. TD 3,900 ft.

C. P. Thurlkill 1-A Overcash, Sec. 960, TE&L Sur. Dry. TD 1,312 ft.

### NORTH TEXAS

Archer County: J. D. Burkett 1 Burkett, J. Armstrong Sur., A-762. Dry. TD 1,327 ft.

Burkett 1 Z. T. Burkett, Armstrong Sur., A-762. Dry. TD 1,301 ft.

Burkett 1 Powell, Blk. 4, William Henry Sur., A-163. Dry. TD 1,450 ft.

T. B. Cochran 1-C Abercrombie, Blk. 23, J. W. Harris Subd. Dry. TD 1,472 ft.

H. W. Darden 1-B Kunkel, Blk. 13, Wm. Ainsworth Sur. Dry. TD 1,294 ft.

Darden 2-B Kunkel, Blk. 13, Wm. Ainsworth Sur. Dry. TD 1,285 ft.

McGehee et al 1 Alsup, A. Newman Sur., A-330. Dry. TD 1,112 ft.

R & S Drilling Co. 1 Steen, C. Ballinger Sur., A-14. Dry. TD 829 ft.

Baylor County: Texan Oil Co. 1 Higgins, C. Winters Sur., A-558. Dry. TD 5,470 ft. Elev. 1,276 ft., Mississippian 5,407 ft., Chappell 5,458 ft.

Clay County: Frank Ausanka 1 Sparkman, Sec. 62, Wood CSL. Dry. TD 4,401 ft.

G & R Drilling Co. 1 Schnabel & Dowlen, Blk. 160, Byers Bros. Subd. Dry. TD 1,907 ft.

Harvey Drilling Co. 1 Huddleston, J. H. Belcher Subd., Blk. 96. Dry. TD 4,675 ft.

Cooke County: Burt Oil Co. and Broday Drilling Co. 1 Harris, SPRR Sur., A-979. Dry. TD 2,665 ft.

Howell, Holloway & Howell 1 Smith, J. J. Ozment Sur., A-807. Dry. TD 3,494 ft.

Grayson County: Howell, Holloway & Howell 1 Dickey, Jas. Coryell Sur., A-261. Dry. TD 7,903 ft.

Jack County: Leatherwood Drilling Co. 1 Reeves, J. W. Preve Sur., A-1163. Dry. TD 3,500 ft.

Russell Maguire 1 Jones-Richards, T. H. Henderson Sur., A-1263. Dry. TD 5,230 ft.

G. E. Penn 1 Richards, MEP&P Sur., A-424, 7 mi. S Jacksboro. IP 313 BOPD, 20/64-in., 42°, TP 280 psi., GOR 800 cu. ft., conglomerate pay 5,016-24 ft. TD 5,150 ft.

Star Oil Co. 1 Henderson, A. Fenter Sur., A-1079. IP 344 BOPD, 18/64-in., 42°, TP 250 psi., GOR 635 cu. ft., Caddo pay 5,000 ft. TD 5,075 ft.

Knox County: Falcon Seaboard Drilling Co. 1 Burnison. Dry. TD 6,035 ft. Elev. 1,485 ft., Ellenburger 6,007 ft.

Montague County: The Texas Co. 1 A. H. Fenoglio, Ussery Sur., A-824. IP 180 BO in 16½ hr., 20/64-in., 48°, GOR 400 cu. ft., TP 275 psi., conglomerate 6,648-66 ft. TD 6,741 ft.

Wichita County: John & Pat O'Neil 1 Krohn, 11-A147-H&GN. Dry. TD 1,994 ft.

Young County: L. T. Burns 2 Rubenkoenig, J. Poitevent Sur. 1, A-227. Dry. TD 3,348 ft.

Craig, Fowler & McClintock 1-B Scobee, TE&L Sur. 201. Dry. TD 4,892 ft.

San Juan Drilling Co. 1 Wooten-King, TE&L Sur. 287. Dry. TD 3,215 ft.

Timberlake, Kelleher & Scott 1 Harrison, Blk. 2706, TE&L Sur. Dry. TD 3,808 ft.

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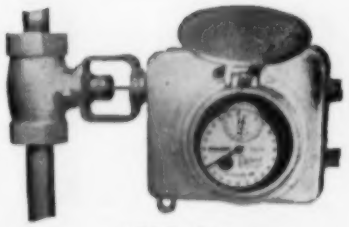

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## WILDCAT COMPLETIONS

### WEST TEXAS

Borden County: Brahaney Drilling Co. 1 Acosta, 8-33-T1N-T&P, 3 miles NE Ackerly. IPP 105 BOPD, 35°, Spraberry 7,565-7,680 ft. TD 9,185 ft.

Coke County: Woodward & Co. 1 McDonald, Sec. 8, L. H. Griffith Sur. Dry. TD 7,260 ft.

John J. Eisner 1 Humlong estate, Sec. 383, Emil Hank Sur. Dry. TD 5,720 ft.

Miami Operating Co. 1 Ellwood, 21-15-SPRR. Dry. TD 7,411 ft. Ellenburger 7,294 ft., Mississippian 7,220 ft.

Howard County: Van-Grisso Oil Co. and W. W. Harvey 1 Carpenter, 17-25-H&TC, 16 miles NE Big Spring. IP 496 BOPD. 22/64-in., 37°, TP 625 psi., GOR 782 cu. ft., Wolfcamp 6,675 ft. TD 6,702 ft.

Midland County: Lone Star Producing Co. 1 Foster, 2-41-T2S-T&P, 2 miles NW Warfield. IP 260 BOPD, 19/64-in., 48°, TP 660 psi., GOR 1,400 cu. ft., perforated Strawn 10,633-10,653 ft. TD 10,653 ft.

Mitchell County: McAlester Fuel Oil Co. 1-A Largent, 8-17-SPRR, 23 miles SW Colorado City. IP 69 BOPD, ¼-in., 41°, TP 150 psi., GOR 921 cu. ft., Fusselman perforations 8,465-70 ft. TD 8,794 ft.

Runnels County: Currey, Shield & Currey 1 Mackey, 272-A49-M. H. Brian Sur., 5 miles W Norton. IP 111 BOPD, 16/64-in., 37°, TP 160 psi., GOR 90 cu. ft., pay 4,239-44 ft. TD 4,296 ft.

Haywood & Anderson 1 Cotton, Alex Lessassier Sur. 174. Dry. TD 3,007 ft.

Thos. D. Humphrey & Sons 1 McKissack, Sec. 5, Norvelle Travis Sur. 533. Dry. TD 4,250 ft.

Scurry County: Fred Goodstein 1 Browning, 537-97-H&TC, 2 miles NW Fluvanna. IP 203 BOPD, 28/64-in., 41°, TP 225 psi., GOR 484 cu. ft., Strawn 7,866-81 ft. TD 8,373 ft. Strawn extension in Fluvanna field.

### NORTHERN NEW MEXICO

Rio Arriba County: Phillips Petroleum Co. 1-E Indian, SE NW NE 31-29n-3w. IP 20,060 M.c.f. daily, Pictured Cliff, openhole 3,882-3,905 ft. TD 3,905 ft. (New field.)

Sandoval County: Albuquerque Association 1 Virgil, W½ NW SE 14-12n-6e. Temporarily abandoned. TD 1,038 ft.

San Juan County: Claude 1 Pipkin, NW SE SE 31-30n-14w. Temporarily abandoned. TD 3,615 ft.

### OHIO

Muskingum County: Ohio Fuel Gas Co. 1 F. M. Cartwright, Section 6, Brush Creek Township. Dry. TD 4,055 ft. in Clinton.

Noble County: B. H. Putnam et al 1 Noble Wiley, Section 15, Sharon Township. Dry. TD 5,504 ft. in Clinton.

Tuscarawas County: Stone Creek Brick Co. Co. 1 Dr. Wherley, Section 13, Jefferson Township. Dry. TD 4,823 ft. in Clinton.

### ILLINOIS

Christian County: V. I. Helgen 1 Forden, SW SE NE 10-15n-2w. Dry. TD 1,912 ft.

Helgen 1 Etter, NE NW SW 34-15n-2w. Dry. TD 1,935 ft.

Clinton County: E. J. Goldschmidt 1 Timmerman Bros., NW NE NW 11-2n-4w. Dry. TD 2,303 ft.

Cumberland County: Henry Ringger 1 Stewart, NE NW NW 2-9n-10e. Dry. TD 750 ft.

Edgar County: L. Hamilton 1 Jones-Cline

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Gauge glass in Inferno gauges is 1" thick, especially tempered and heat treated. This glass is held in the gauge by equal pressure on both sides around the entire edge of the glass. The body is available in three different metals, and is machined from solid bar stock. Write for Bulletin 23-A.

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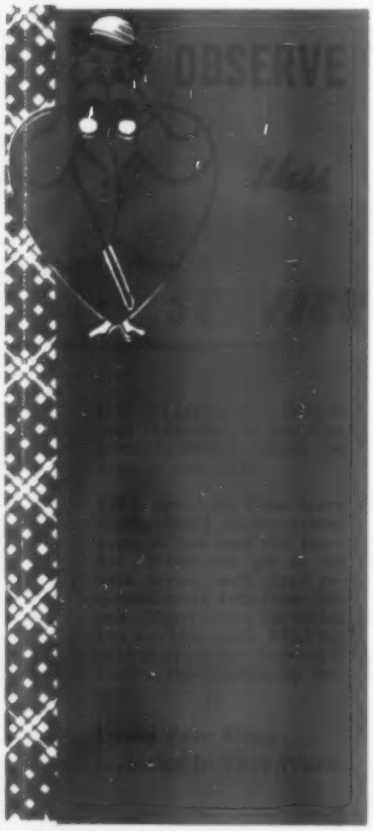

## WILDCAT COMPLETIONS

Commission, NW SE NW 29-13n-12w. Dry. TD 1,050 ft.

Mercer County: Nelson-Patterson-Edwards 1 Larson, SW SW NE 28-15n-4w. Dry. TD 730 ft.

Montgomery County: Delta Drilling Co. 1 Janssen, NW SE NE 4-10n-3w. Dry. 2,288 ft.

White County: Ralph Halbert 1 Ridenour NW NW NE 21-3s-10e. Dry. TD 3,339 ft.

### INDIANA

Gibson County: T & H Corp. 1 Princeton Minning Co., SW SW NW 21-2s-12w. Dry. TD 3,040 ft.

Sullivan County: F. B. Cline 2 Larr-Strawn, NW NW NE 9-9n-8w. IPP 6 BOPD, 18 BWPD, Devonian 1,936-55 ft. TD 1,993 ft.

### KENTUCKY

Hancock County: Basin Drilling Co. 1 Joe Pate, NW SE SE 5-R-33. Dry. TD 1,635 ft.

Henderson County: Slagter Production Co. 1 Wycliffe, NW SW SW 15-Q-21. Dry. TD 2,788 ft.

### KANSAS

Graham County: Vernon Oil & Gas Co. 1 Schock, NE NE NW 9-6s-23w. Dry. TD 4,012 ft.

Jackson County: Jackson County Petroleum Co. 1 Robinson, SE SE NW 18-8s-16e. Dry. TD 3,078 ft.

McPherson County: M & L Oil Co. 1 Otte, NW NW NW 21-20n-1w, Dry. TD 3,004 ft.

Norton County: Jones, Shelburne & Farmer (no farm name), SW SE SW 11-4s-22w. Dry. TD 3,767 ft.

Reno County: Schermerhorn Oil Co. 1 Nies, SE NW NW 20-25s-10w. Dry. TD 4,390 ft.

Rooks County: H. G. Kaiser 1 Lambert, SE SE SE 30-9s-20w. Dry. TD 3,917 ft.

Rush County: Aurora Gasoline Co. 1 Anderson, SE SE NE 26-19s-20w. Dry. TD 4,542 ft.

Smith County: C. L. Lasky 1 Habiger, S½ SE SW 34-2s-11w. Dry. TD 4,250 ft.

Summer County: T. N. Berry 1 Mason, NE NE SW 2-34s-2w. Dry. TD 4,589 ft.

### MICHIGAN

Newaygo Couny: Ace Oil Co. 1 Boes, SW SW SW 4-12n-14w. Dry. TD 2,115 ft. in Traverse lime.

Ottawa County: Miller Brothers 1 Masselink, NW NE NW 28-5n-14w. Traverse lime 1,490 ft., IPF 100 BOD through a ½-in. choke, pay 1,490-91 ft., TD 1,491. (New pool.)

### ALABAMA

Baldwin County: Stanolind Oil & Gas Co. et al 1 U. S. Steel, C SE SE 25-4s-4e. Dry. TD 7,844 ft. Elev. 130 ft., Lower Cretaceous 7,677 ft.

Clarke County: Sunnyland Contracting Co. 1 Lammon, C SW SW 19-7n-3e. Dry. TD 5,666 ft. Elev. 277 ft., Lower Cretaceous 5,486 ft.

### MISSISSIPPI

Jefferson County: Gauthier-Heard 1 Junkin, 11-9n-2w. Dry. TD 6,064 ft. Elev. 74 ft., Wilcox 3,625 ft., Artman zone 5,320 ft.

Yazoo County: Carleton Billups and Carl Duffield, Jr., 1 Wise, SW SW SW 29-12n-2w. Dry. TD 7,325 ft. Elev. 107 ft.

### SOUTH LOUISIANA

Acadia Parish: Tide Water Associated Oil Co.


For Easiest Pipe Work ...it's the New 20

RIDGID

8 sizes for pipe from ⅛" to 6"

**More utility for your money in RIDGID Bench Vises**

• No wonder this bench yoke vise is popular everywhere! You can make the yoke open for either right or left hand. It has an integral pipe rest for easier cutting or threading . . . built-in pipe bender . . . strong special malleable yoke and base . . . LonGrip jaws of top quality tool-steel. You simply can't beat it for efficient easy operation that lasts for years! Buy it at your Supply House.

Same work-saver features in RIDGID post, kit and stand yoke vises and bench, post and stand chain vises.

RIDGID Chain Bench Vise, ⅛" to 8"

THE RIDGE TOOL COMPANY • ELYRIA, OHIO, U. S. A.

RIDGID
Work-Saver Pipe Tools

## WILDCAT COMPLETIONS

I Johnson, C NW SE 6-8s-3e. Dry. TD 12,036 ft.

Cameron Parish: Magnolia Petroleum Co. 1-A State Lease 1172, Blk. 9, East Cameron area, Gulf of Mexico. Dry. TD 13,872 ft.

Forest Oil Corp. 2 Miller, 29-15s-5w. IP 1,500,000 M.c.f. daily and 30 BCPD, ⅛-in., 50.2°, perforations 9,918-25 ft. (Miocene). TD 13,102 ft. (New Field.)

East Baton Rouge Parish: Lamson, Bennett & Cole 1 State Lease 1909, 66-8s-1w. Temporarily abandoned. TD 10,629 ft.

Jefferson Parish: Superior Oil Co. 1 city of New Orleans, 83-14s-23e. Dry. TD 11,510 ft.

Humble Oil & Refining Co. 7-C State Lease 802, Tract 1117, Blk. 19, Grand Isle area, Gulf of Mexico. IP 701 BOPD, ¼-in., 32.7°, Miocene 8,082-8,105 ft. (perforations). TD 8,960 ft. (New pay in Grand Isle Block 18 field.)

Jefferson Davis Parish: Sunray Oil Corp. 1 Deshotels, 12-8s-6w. Dry. TD 10,500 ft.

Plaquemines Parish: Atlantic Refining Co. 1 State Lease 1260, Blk. 16, Main Pass area of Breton Sound. Dry. TD 9,661 ft.

California Co. 2 Price, 18-19s-18e (West Coquille Bay area). Dry. TD 11,500 ft.

Gulf Refining Co. 3 Buras Levee District-State Unit, 16-23s-31e (Scott Bay). Dry. TD 10,619 ft.

Richardson & Bass 3-E State Lease 1891, 4-21s-26e. Dry. TD 16,890 ft.

St. Mary Parish: Southern Natural Gas Co. 1 Zenor, 41-15s-11e. IP 288 BOPD, 10/64-in., 35°, perforations 12,912-15 ft. TD 13,425 ft. (New pay and first oil production in Patterson field.)

### OKLAHOMA

Beckham County: Herman Brown 1 Ham, NE NW 25-10n-26w. IP 32 BOPD, 32/64-in., 3,400 M.f.g., Pawnee 5,636-54 ft. TD 10,294 ft.

Caddo County: Vickers Petroleum Co. 1 Trogdon, SE NW 9-6n-9w. Dry. TD 11,160 ft. Medrano sand 9,855-9,900 ft., Marchand sand 10,500 ft.

Carter County: Sinclair Oil & Gas Co. 1 Leon Voorhees, NE NW NE 13-3s-3w. IP 49 BOPD, ¾-in., 42°, pay 6,203-32 ft. TD 6,513 ft.

Comanche County: A. G. Hill 1 Grimes, NE NW NE 17-1s-10w. Dry. TD 2,402 ft.

Cleveland County: Henry O. Brendle 1 Geno, NW NW SE 14-7n-1w. Dry. TD 7,995 ft. Hunton 6,552 ft., Viola 6,790 ft.

Ellis County: Lynn Drilling Co. and Carter Oil Co. 1 Wisner, SW NE 12-23n-23w. Dry. TD 8,285 ft. Morrow sand 7,931 ft.

Hughes County: Thomas Drilling Co. 1 Thompson, NW SE NW 2-6n-8e. Dry. TD 3,350 ft.

Kay County: Royal Oil Co. 1 Huene, 9-28n-2e. Dry. TD 3,663 ft.

Russell Cobb 1 State, SE NE NE 36-27n-28n. IPP 25 BOPD, pry 3,461-71, 3,614-34 ft. TD 3,704 ft.

Lincoln County: Olin Oil & Gas Corp. 1 Lee, NW NE NW 32-13n-4e. TD 4,550 ft.

C. W. Dobson & M. M. Hoxsey, 1 Kriel, NE SE NW 33-15n-2e. Dry. TD 5,394 ft. Wilcox 5,262 ft., second Wilcox 5,383 ft.

N. V. Duncan 1 Sporn Estate, 22-16n-3e. Dry. TD 4,547 ft.

Logan County: Gulf Oil Corp. 1 Brady, NE SW NW 31-15n-1w. Dry. TD 6,150 ft. Second Wilcox 6,132-50 ft.

Noblee County: J. M. Henry 1 Miller, NE NE NE 12-22n-2w. Dry. TD 2,300 ft.

Osage County: B. R. Albert (no farm name), 7-26n-7e. Dry. TD 3,001 ft.

Pawnee County: S. C. Yingling 2 Griesel, NE NW NW 2-21n-5e. Dry. TD 3,070 ft.

Payne County: J. R. McLean Oil Co. 1 Kirk, SW SW SW 34-18n-3e. Dry. TD 4,209 ft.

Pontotoc County: Barton-Rich 1 Horsley, SE NE NW 19-4n-4e. TD 1,947 ft.

Pottawatomie County: W. O. Allen 1 U.S.A., NW SW NE 35-6n-3e. Dry. TD 4,436 ft.

### OKLAHOMA PANHANDLE

Texas County: United Production Co. 1 Hamilton, NW NW SE 6-5n-10ECM. IP 14,000 M.f.g., pay 4,631-36 ft. rock pressure 875 psi. TD 4,780 ft.

### NEBRASKA

Cheyenne County: Willits & Craig and Carmack Drilling Co. 1 Leafdale, C NE SW 25-17n-52w. Dry. TD 5,440 ft.

Sure Oil Co. 1 Clawson, SE SE SE 31-16n-54w. Dry. TD 6,128 ft.

### NORTH DAKOTA

Logan County: Caroline Hunt, trust estate, et al 1 Fuller, SW SE 6-136n-73w. Dry. TD 5,105 ft.

McHenry County: J. P. Owen 1 Bromley, SW NW 27-153n-75w. Dry. TD 3,830 ft.

Mountrail Couty: W. H. Hunt 1 Anderson, C NW NE 25-157n-89w. Dry. TD 10,671 ft.

Pierce County: Cardinal Drilling Co. 1 Bell, SW NW 27-158n-72w. Dry. TD 3,051 ft.

Rolette County: Cardinal Drilling Co. 1 Swanson, SE NE 8-160n-73w. Dry. TD 3,098 ft.

S. D. Johnson 1 Tingelstad State, SW SE 3-163n-70w. Dry. TD 2,826 ft.

THE OIL AND GAS JOURNAL

"When are you going to do something about this leaky basement?"

HIGHER RECOVERY
FASTER CORING TIME
FEWER TRIPS
DRILLING & SERVICE
DIAMOND WIRE LINE
CORE BARRELS
Now available in four sizes: 4¼" OD, 4½" OD, 5¾" OD, and 6⅞" OD to cut hole from 4½" diameter up.
Whether in slim-hole or conventional drilling, D & S Diamond Equipment for wire line coring will merit consideration.
TRUCO DIAMOND BITS
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Another of 15 reasons why **REED** tool joints last longer!

# "TAILORED" HEAT TREATMENT

FROM this control room, the heat treat foreman "tailors" the treatment of each batch of **REED** Tool Joints to fit the exact physical characteristics of the heat of steel from which they are made.

This "tailored" heat treatment results in tool joints that are tougher, safer and longer wearing than they would be if standard AISI specifications were used for all heats.

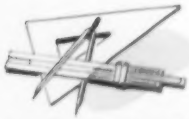
Such extras as "tailored" heat treatment are extra trouble for **REED** production and inspection departments—but they are important reasons why **REED** Tool Joints have the strength, toughness and wear resistance to give longer life with safety.

PESA

**REED** ROLLER BIT COMPANY

HOUSTON 1, TEXAS

# 15 reasons why REED tool joints last longer!



**Advanced design.** The list of **REED** tool joint developments is assurance that **REED** Tool Joints contain all the latest improvements in design.

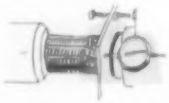
**Chemical analysis** of every heat of steel is checked by spectrograph.

**Strength and toughness** of every heat of steel are determined by three different testing machines.

**Grain structure and grain flow** are checked by microscope. **REED** Tool Joints meet the very highest standards.

**Hardenability tests** are made and form the basis for the "tailored" heat treatment of tool joints made from different heats of steel.

**Precision machining** is accomplished by specially designed automatic machines.



**Jigs and fixtures** of the highest precision assure perfect alignment and concentricity of **REED** Tool Joints.

**Thread comparator** checks hob used to cut **REED** Tool Joint threads, assuring accuracy of thread form, lead and taper.

**Automatic heat treating furnaces**—especially designed for the job—heat tool joints to utmost precision in a carefully controlled atmosphere.

**This central control room** enables the heat treat foreman to "tailor" the treatment of each heat of steel to extreme accuracy.

**Precision quenching and drawing** complete the "tailored" heat treatment that gives the best combination of strength and toughness to every tool joint.

**Hardness testing** is final assurance that every **REED** Tool Joint is strong and tough.

**Tool joint threads are treated** to prevent galling during breaking-in. Complex metal phosphate coating acts as a pre-lubricant infused into the threads.

**"Reedite" hard facing**—available on order—is factory applied to resist abrasion better and make tool joints last longer.

**These hand gauges**, plus comparators, master gauges, profilimeters, magnaflux and other machines, are used to make the 120 inspections each tool joint must pass.

**REED ROLLER BIT COMPANY**

**HOUSTON 1, TEXAS**

## WILDCAT COMPLETIONS

Williams County: W. H. Hunt 1 Weyrauch, C NE NW 27-156n-97w. Dry. TD 9,341 ft.

### CALIFORNIA

Fresno County: Los Nietos Co., operator 78-22 Guijarral Service, 22-20s-16e. Dry. TD 8,923 ft.

Kern County: Oceanic Oil Co. 1A-17 C.W.O.D., 17-32s-23e. Dry. TD 3,902 ft.

Standard Oil Co. of California 51 Classen, 28-29s-26e. Dry. TD 7,730 ft.

Los Angeles County: General Exploration Co. 3 C.C.M.O., 17-2s-12w. IPF 245 BOPD, 40.8° gravity, 18/64-in. choke, perforations 5,404-5,589 ft. TD 6,600 ft. (New fault block pool in Bandini field.)

San Luis Obispo County: Neaves Petroleum Dev. 3 Neaves-Elkhorn, 23-32s-22e. Dry. TD 2,240 ft.

Union Oil Co. 52-17 Union-Sugar, SW NE 17-10n-35w, IPP 32 BOPD, 13.8° gravity, perforations 4,544-4,767 ft. TD 4,770 ft. (New field discovery 2½ miles southeast of Guadalupe field.)

Solano County: Arcady Oil Co. 2 Fahn, 8-5n-3e. Dry. TD 4,850 ft.

Tulare County: Andrews & Lancaster 1 Parish, 16-22s-27e. Dry. TD 1,069 ft.

C. W. Colgrove 48-26 Green, 26-21s-23e. Dry. TD 5,230 ft.

Roberts & Avery 1 Well, 15-22s-27e. Dry. TD 901 ft.

Ventura County: The Texas Co. 1 K. H. Hunter-River Ranch, 36-4n-20w. Dry. TD 10,110 ft.

Union Oil Co. X-10 Ex Mission, 9-3n-22w. Dry. TD 10,295 ft.

### WYOMING

Washakie County: Sinclair Oil & Gas Co. 1 Unit, NW NW SE 28-45n-91w. Dry. TD 10,505 ft.

### UTAH

Duchesne County: Carter Oil Co. 1 Paulson, W½ NW SE 31-3s-4w. Dry. TD 8,934 ft.

### COLORADO

Adams County: Twin T. Drilling & Production Co. 1 Ferguson, C NW NW 15-2s-62w. Dry. TD 7,272 ft.

Baca County: Amerada Petroleum Corp. and Western Natural Gas Co. 1 Vail, SW SW NE 19-29s-41w. Dry. TD 5,622 ft.

Logan County: B. F. Allison 1 Peavey, C NE NW 21-11n-55w. Dry. TD 5,750 ft.

Harper-Turner and Dunn & Boreing 1 Stanton & Daley, SE SE NE 15-6n-54w. Dry. TD 4,968 ft.

Midwest Oil Corp. and Balderson Denver 1 Peavy, C SW NE 23-11n-55w. Dry. TD 5,495 ft.

Morgan County: F. W. Baumgartner 1 Ross, SE SE SW 10-3n-59w. Temporarily abandoned. TD 6,065 ft.

S. D. Johnson 1 Lind-Bacon, C SW SW 19-3n-57w. IP 2,000 M.c.f. daily and 40 BCPD, "D" sand 5,542-44 ft. (perforations). TD 5,640 ft. in "J" sand. (New field.)

Curtis T. Kinard 1 Loose, C SW SW 20-5n-59w. Dry. TD 6,376 ft.

J. A. McRae 1 Glenn, SW SW SE 4-1n-57w. IP 15,000 M.c.f. daily (estimated), "J" sand 5,456 ft. TD 5,525 ft. (New field.)

Petroleum, Inc., 1 Homes, NE NE SW 30-2n-60w. Dry. TD 6,642 ft.

Sharples & Exploration Drilling Co. 1 Staner, SW SW SE 34-6n-55w. Dry. TD 5,380 ft.

Shell Oil Co. 1 Peterson, C NE SE 28-5n-55w. Dry. TD 5,116 ft.

Washington County: C. A. Floto 1 Neiman, SW SE SE 11-1s-55w. IPP 55 BOPD, 38°, "D" sand 4,784-88 ft. (perforations). TD 5,040 ft. in Skull Creek. (New field.)

C. A. Floto 1 Kejr, NE NW NW 6-2s-55w. Dry. TD 5,197 ft.

### MANITOBA

Canadian Oil-Gas Reserves 1 Uno, LSD 15, 10-14-27w1. Dry. TD 1,744 ft.

### SASKATCHEWAN

Tide Water 2 Biggar Crown, LSD 9, 20-34-14w3. Dry. TD 2,828 ft.

Imperial 6-5 Cloverhill, LSD 6, 5-29-24w3. Dry. TD 2,360 ft.

Charter-Canadian Devonian 5-21 Empress, LSD 5, 21-22-29w3. Dry. TD 2,910 ft.

Imperial 1 Esk, LSD 7, 14-33-20w2. Dry. TD 6,520 ft.

Husky 1 Hill Valley, LSD 9, 6-53-27w3. Dry. TD 1,928 ft.

Tide Water 1 Tyner Crown, LSD 4, 29-23-18w3. Dry. TD 2,631 ft.

Rio-Prado 13-18 Edam, LSD 13, 18-49-19w3. Dry. TD 1,950 ft.

Rio-Prado 4-17 Lemsford, LSD 4, 17-21-23w3. Dry. TD 3,678 ft.

Tide Water 1 Bear Crown, LSD 4, 18-22-16w3. Dry. TD 2,331 ft.

### ALBERTA

Merrill Calvan et al 3-28, LSD 3, 28-72-8w6. Dry. TD 7,315 ft.

Imperial 1 Black Creek, LSD 10, 27-109-9w6. Dry. TD 7,329 ft.

Cleary 13-19 Driedmeat, LSD 13, 19-45-19w4. Dry. TD 3,250 ft.

Shell 7-12-A Wolf Creek, LSD 7, 12-53-15w5. Dry. TD 6,917 ft.

### BRITISH COLUMBIA

J. B. White-Sun 3 Nominee Blueberry, Unsurveyed territory. Gas well. TD 7,556 ft.


WHEATLEY'S

3½" x 5" PISTON PUMP

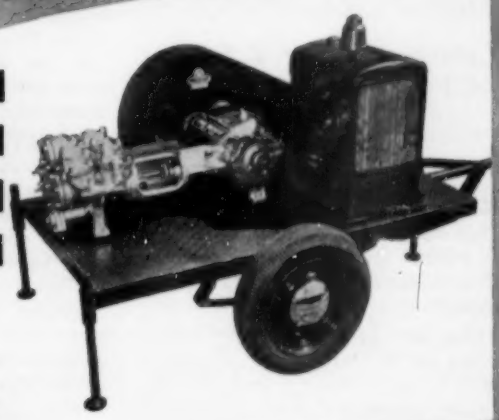
SAVES $1,000.00*

SALT WATER DISPOSAL

WATER FLOODING

CRUDE GATHERING

ALL-PURPOSE UTILITY



BRONZE • IRON • STEEL FLUID ENDS

FIG. 535
SKID OR TRAILER MOUNTED

SPECIFICATIONS

| Piston | Stroke | BPH | PSI | HP | Wt. Lbs. |
|---|---|---|---|---|---|
| 2" | 5 | 35 | 900 | 15 | 700 |
| 2½" | 5 | 56 | 520 | 15 | 700 |
| 3" | 5 | 83 | 350 | 15 | 700 |
| 3½" | 5 | 115 | 255 | 15 | 700 |

Plunger Load, 2500#

- HERRINGBONE GEARS
- REDUCING LINERS
- POT TYPE FLUID END
- NO ROD OVERLAP
- ANTI-FRICTION BEARINGS
- CONTROLLED LUBRICATION

* TOTAL UNIT SELLS FOR $1,000 UNDER CONVENTIONAL 4" x 6" FIELD PUMP AND ANSWERS MOST PURPOSES

OVER 1,200 UNITS NOW IN USE!

WHEATLEY PUMPING UNITS AVAILABLE THROUGH:

Charles Wheatley Cos. • Franklin Supply Co. • J & L Supply Co.
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WHEATLEY
PUMPS & VALVES
TULSA 3, OKLAHOMA

# PERSONALS

## Foreign Veteran

### Metzger now in U. S. after 33 years in South America

THE recent election of Herman A. Metzger as director and vice president of Creole Petroleum Corp. in charge of the company's New York office brings this veteran Jersey Standard official to the United States after 33 years of continuous service in South America.

Metzger's record in this respect is one of the longest of any in the entire Jersey Standard organization. His present connection with Venezuelan operations rounds out a career that has previously included assignments in Colombia, Brazil, Bolivia, Argentina, and Chile, not counting shorter visits at one time or another to practically all the other countries of the continent.

"Ham" Metzger, as he is called by his friends (the nickname comes from his initials) took charge of Creole's office in the Empire State Building in New York last month, succeeding Dr. Cecil L. Burrill, who became manager of Jersey Standard's new general economics department. Metzger reached New York the long way from his last assignment in Argentina, using 3 months accumulated leave for a round-the-world vacation trip with Mrs. Metzger and their three teen-age children.

Metzger, who was born in New York City in 1900, graduated from Cornell with an engineering degree in 1921. He had done vacation work for American Telephone & Telegraph, and in September of that year went to Colombia on a 2-year contract, primarily to help install some generating equipment at Barrancabermeja. In those days the Colombian oil industry was just beginning to use air transportation, and the trip to Barrancabermeja was still 8 or 9 days up the Magdalena River by stern-wheeler.

The generators were delayed, and though hired as a junior electrical engineer, Metzger was assigned general engineering duties at Tropical Oil Co.'s Barrancabermeja refinery, which was then a newly built plant of about 500 bbl. daily capacity with two batch stills. Because engineering was then by no means the specialized profession it now is and because the Tropical operation was relatively small, Metzger held a variety of assignments, among them the building of the refinery canning plant and the making of topographical route surveys for the Andian National crude line which was completed in 1926. Later, as assistant general manager for the Tropical operations, he dealt with the drilling and production activities of the concession.

From 1928 to 1937 Metzger was in Bogota as executive representative, handling among other matters government relations for the Tropical and Andian companies. In October of that year, he went to Bolivia following the confiscation of the Jersey Standard properties in that country and there represented the company as president of Standard Oil Co. of Bolivia in connection with its compensation claims.

Two years in Bolivia were followed during the early 40's by several special assignments in Brazil and Chile. His work during this period included following the company's general interests and surveying production possibilities. In November 1944 he was moved from Brazil to Argentina, where he took over the general management of the Jersey affiliates' integrated operations in that country.

Metzger's many years in South America have given him a close knowledge of the oil industry in that part of the world, not only in operations but also its political and economic aspects. During the last year of his nearly 10 years of service in Argentina, he managed the company's interests during a time when the new Argentine oil policy more receptive to foreign private capital was first beginning to develop.

**J. Little** has joined Dow Chemical Co.'s Texas Division at Freeport as a research and development engineer in the organic pilot-plant laboratory.

**Duncan A. McNaughton,** former geologist for Gulf Oil Corp. at Houston, has resigned to take a position as consulting geologist with Meyer & Achtschin of Dallas.

**Charles Pennypacker Smith,** chief gas dispatcher of Pacific Gas & Electric Co. since 1943, has been promoted to senior gas supply and meteorological engineer. **Jesse C. Moss** will succeed Smith as chief gas dispatcher.

**P. R. Williams** was elected vice president of Sterling Oil Co. of Oklahoma, Inc., at a recent meeting of the board of directors in New York City. Williams joined Sterling in 1952 as head of the land department and will continue to hold this position in his new capacity.

**W. L. Ambrose** has resigned from Cities Service Oil Co. in Fort Worth, to enter private business in California. **C. F. Froeb** will assume Ambrose's duties as representative of Cities Service Oil Co., crude oil division, in Fort Worth.

**Paul Horn,** Sun Oil Co., has been elected president of the Panhandle Geological Society succeeding **Arthur H. Petsch,** Ohio Oil Co. Other officers elected were: **Jack H. Tarver,** Phillips Petroleum Co., vice president; **W. H. Fitzgerald,** Continental Oil Co., secretary, and **R. M. Strom,** Cities Service Oil Co., treasurer.

**Monty G. Martin** has been appointed chief geologist of Texas Gas Transmission Co. Martin had been employed previously by Southwest Natural Gas Co. and Carter Oil Co.

**D. L. Maclachlan,** formerly industrial-relations coordinator for Shell Co. of Singapore, has taken charge of exploratory operations in Qatar on behalf of Shell Overseas Exploration Co., Ltd. Maclachland served with Shell in Argentina and Venezuela prior to the war. From 1945 to 1950, he was with Caribbean Petroleum Co. in Maracaibo.

# PERSONALS

**Seth L. Lobdell,** geologist with Sun Oil Co. at Alpine, Tex., has been transferred to the district office at Las Vegas, N. M.

**Gerald Nelson Smith** has joined Texas Pacific Coal & Oil Co., Fort Worth, as assistant chief geophysicist. Prior to joining Texas Pacific, Smith was associated with Stanolind Oil & Gas Co., United Geophysical Co., and Mid-Continent Petroleum Corp.

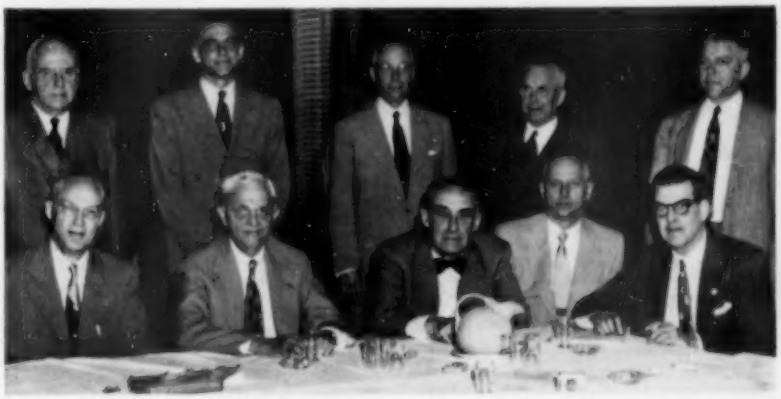
**Laurance A. Gleason** has been promoted to assistant to the vice president in charge of manufacturing for Tide Water Associated Oil Co.'s eastern division. Gleason has been technical assistant to the general superintendent at the company's Bayonne, N. J., refinery since December 1951.

**Raymond T. Laird,** formerly development engineer with Standard Oil Co. of California at Los Angeles, has resigned to open offices as a petroleum consultant in Oxnard, Calif.

**R. W. Sole** has been appointed general superintendent of the production division of Arkansas Fuel Oil Corp. Sole has been with Arkansas since 1920 and has served in various capacities in the production division. Since 1949 he has served as assistant superintendent of production.

**D. W. Graham** has been promoted from district geologist at Midland, Tex., to regional chief geologist by Plymouth Oil Co. **W. W. Hutchins,** formerly production superintendent in the Benedum area, has been named superintendent of drilling and production in the company's West Texas-New Mexico district.

**Don Hageman** has been chosen permanent chairman of the Montana Oil and Gas Conservation Commission. Hageman, a commission member since the board was founded in 1952, replaces **Tom Barnes,** who was serving as active chairman and now returns to his original post of vice chairman.



## Appointed to Promote Pennsylvania Grade Crude Oil

**At the recent meeting of Pennsylvania Grade Crude Oil Association's board of directors in Pittsburgh, these men were appointed to make plans to put more emphasis on promoting Pennsylvania oils in the domestic market. Members of the committee are: (seated left to right) A. W. Scott, Wolf's Head Refining Co., Inc., Oil City, Pa.; W. R. Reitz, Quaker State Oil Refining Corp., Oil City; H. A. Logan, United Refining Co., Warren, Pa.; E. H. Fallin, Washington, assigned to work with the committee; W. C. Wenzel, Association executive manager, Oil City. Standing are Fayette B. Dow, Washington, D. C., association vice president and general counsel; G. H. Osborne, Kendall Refining Co., Bradford, Pa., sitting in for J. B. Fisher of Kendall; B. T. Haskins, independent producer, Wellsville, N. Y.; A. C. Simmons, Simmons Oil Co., Bradford. Other committee members not present when the picture was taken are W. S. Zehrung, Pennzoil Co., Oil City, and F. G. Bannerot, Jr., Elk Refining Co., Charleston, W. Va.**

**Harry P. McClintock** has resigned as manager of Tex Harvey Oil Co. to become a consultant. McClintock will specialize in gas-utilization problems of independent operators.

**R. S. McFarland,** as president, has become chief executive officer of Seaboard Oil Co. following the retirement of **John M. Lovejoy,** chairman of the board. Lovejoy, who previously served as chief executive officer of the company, has not been replaced as chairman.

**C. A. Chipman** was reelected president of Pennsylvania Grade Crude Oil Association at its recent Pittsburgh meeting. **E. M. Craig,** Valvoline Oil Co., was elected an honorary director. Craig had been an active director for a number of years. Other officers elected were: **George J. Hanks,** South Penn Oil Co., first vice president; **A. C. Simmons,** Simmons Oil Co., second vice president; **Fayette B. Dow,** vice president and general counsel; **Samuel Messer,** Quaker State Oil Refining Corp., treasurer; **F. W. Alcorn** and **C. L. Suhr** of Pennzoil Co., and **C. G. Johnson,** Quaker State Oil Refining Corp., assistant treasurers, and **W. C. Wenzel,** executive manager. **Robert Wylie,** Pennsylvania Oil & Gas Management Associates, **Harry A. Logan, Jr.,** United Refining Co., **B. L. Heath,** Valvoline Oil Co., Division of Ashland Oil & Refining Co., and **W. A. Peterson,** Northland Products Co., were named new directors of Pennsylvania Grade Crude Oil Association.

**Edward B. Launius,** geologist with Jeffreys & Launius, has opened the firm's new offices at Pensacola, Fla. Launius had previously been located at Jackson, Miss.

**W. L. Connelly,** retired chairman of the board of Sinclair Oil & Gas Co., has chronicled his nearly 60 years in the oil business with a book titled, "The Oil Business as I Saw It: Half a Century with Sinclair." The book will be issued July 20 by the University of Oklahoma Press and it will be illustrated with many pictures of early day oil scenes.

**C. G. Petersen** has been appointed manager of dispatching at Shell Oil Co.'s Wilmington, Calif., refinery, succeeding **I. H. Smith,** who retires July 1. **F. S. Hummel,** recently promoted to manager of thermal cracking, replaces Petersen as manager of alkylation. **M. F. Smith** has moved up to manager of thermal cracking, while **A. G. Smith,** formerly technologist in the alkylation department, has taken over M. F. Smith's former duties as assistant manager of thermal cracking. Two recent

# PERSONALS

transfers were **M. J. Callaghan,** technologist, moved to the Houston refinery; and **W. H. Shippee,** changed from the thermal cracking department to the Los Angeles marketing department.

**John J. Metzger, Jr.,** has resigned from E. G. Bateman Drilling Co. to take a position with Monterey Exploration Co. in New Orleans.

**C. Elton Gore** has been named district geologist for the Kansas district for Lion Oil Co. **John H. Gatchell** has been appointed district geologist for Oklahoma with headquarters at Oklahoma City.

**John P. Coghlan,** vice president and assistant to the president of Pacific Gas & Electric Co., will retire June 30 after more than 48 years' service. He will continue as a member of the board of directors.

**S. B. Severson,** Dominion Natural Gas Co., has been reelected president of the Natural Gas & Petroleum Association of Canada at its 28th annual convention at Windsor. Other officers elected were: **George H. Smith,** Port Colborne, honorary president; **T. Weir, Chatham,** first vice president; **L. B. Mehlenbacher,** Cayuga, second vice president; **J. W. Ostler,** Hamilton, treasurer; **S. C. Hanna,** Hamilton, secretary and assistant treasurer. Directors elected were: **L. G. O'Connor,** Chatham; **John R. Reeves,** Buffalo; **James Farrell,** Fort Eire; **G. A. Stammers,** Brantford; **W. A. Roliff,** Toronto; **C. N. Glenny,** Fort Eire and **S. A. Morse,** Sarnia, both past presidents, were named honorary members.

**Harold G. Mangelsdorf** has been named a director of Esso Standard Oil Co. Mangelsdorf, who was named general manager of manufacturing in 1953, will retain his present post.

**C. A. Davis,** district superintendent for Richfield Oil Corp. at New Cuyama, Calif., was elected chairman of the San Joaquin Valley section of the Petroleum Branch of the American Institute of Mining and Metallurgical Engineers at its June meeting in Bakersfield. **W. J. Taylor,** Lane-Wells Co., was elected vice chairman.

**Frank Rieber, Jr.,** has resigned as an engineer with Ohio Oil Co. to open offices as a consulting petroleum engineer in Bakersfield, Calif.

**Frank Dagley** and **Harry Albaugh,** consulting geologists at Abilene, Tex., have been named by Elm Oil Co., Dallas, to head its newly opened district exploration office in Abilene.

**William M. Goryl** has been named head of the mechanical group of mechanical engineering and economics division by Standard Oil Development Co.

**Albert B. Stevens,** head of the Department of Petroleum Engineering at Texas A. & M. College, has resigned effective July 1 to accept a position as general manager of Farnsworth & Chambers Oil Co. in Houston. Stevens has been associated with Texas A. & M. since 1934.

**Dr. Judson L. Anderson** has joined Columbia Gas System as a geologist specializing in oil and gas reserves estimates. Anderson, a former professor of geology at Johns Hopkins University, has been associated with **Ralph E. Davis,** oil and gas consultant, since 1951.

**J. D. Novotny** has been named field seismograph supervisor for Stanolind Oil & Gas Co.'s Lubbock district. Novotany replaces **P. H. Garrison** who has been transferred to Stanolind's Oklahoma City division office as division geophysical supervisor.

**Donald Towse** has resigned as assistant professor of geology of North Dakota Geological Survey to open consulting offices in Grand Forks, N. D. Towse, who holds a Ph.D. degree from Massachusetts Institute of Technology, formerly worked for Amerada Petroleum Corp.

**George P. Ellison** was elected president of the Kentucky Oil and Gas Association at the group's recent meeting in Lexington. Other officers elected were: **M. G. Powers, K. Z. Wilking, Frank J. Zogg, and O. H. Horne,** vice presidents; **Angus W. McDonald,** secretary, and **J. C. Preston,** secretary-treasurer.

**Harold S. Bowman,** recently returned to the United States after 6 years as a research specialist for Mene Grande Oil Co., Caracas, Venezuela, has joined Three States Natural Gas Co. at Dallas as assistant to the president.

**Wilton E. Scott,** manager of exploration for Buffalo Oil Co.'s West Texas-New Mexico division at Midland, Tex., has been elected a vice president of the firm. Scott joined Buffalo in 1944 and moved to Midland from Artesia, N. M., when the company reopened division offices there. He will continue to be located at Midland.

**H. F. Tomfohrde, Jr.,** has been appointed secretary of the eastern division operating committee and assistant to the vice president and chairman of the eastern division operating committee of Tide Water Associated Oil Co.

**Jack Ryan,** formerly area geologist for Stanolind Oil & Gas Co., has joined Jake L. Hamon, Dallas independent operator, as district geologist in the firm's new Abilene, Tex., office.

# DEATHS

**Earl H. Hughes,** 54, owner of Hughes Oil Well Service Co., died June 6 at his home in Long Beach, Calif.

**Howard C. Kaufman,** independent producer, died in Tulsa recently on his seventieth birthday. Kaufman had been in the oil business most of his life and was a drilling contractor before becoming a producer about 15 years ago.

**William B. Armstrong,** 37, district geologist for Ohio Oil Co., died June 2 in an Ardmore hospital. Armstrong had been associated with Ohio for 8 years.

**Carl Gerding Kustner,** 52, assistant to the general sales manager of Standard Oil Co. (Ind.), died recently in a Chicago hospital.

**H. W. Kelsey,** 82, retired field superintendent for the old Midco Oil Co., died June 6 in Tulsa.

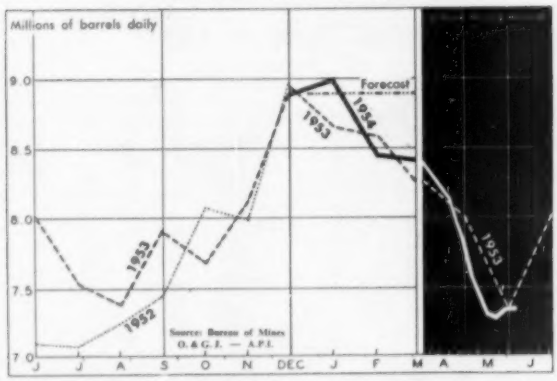
**Robert F. Hays,** 57, independent oil operator of Kerrville and San Antonio, died June 8 at his home in Kerrville. He was leasing in West Texas when the Scurry boom began and is credited with drilling the first well in that big play.

# Latest Figures . . . Industry Trends

## A QUICK LOOK AT THE HIGHLIGHTS

| | LATEST WEEK | Change from WEEK AGO | | Change from YEAR AGO | |
|---|---|---|---|---|---|
| Production | 6,436,250 | DOWN | 350 | DOWN | 101,200 |
| Crude stocks | 279,256,000 | UP | 3,347,000 | DOWN | 1,425,000 |
| Completions | 985 | DOWN | 7 | UP | 101 |
| Refinery runs | 7,144,000 | UP | 124,000 | DOWN | 24,000 |
| Gasoline stocks | 279,256,000 | UP | 3,347,000 | DOWN | 1,425,000 |
| Four-product stocks | 319,522,000 | UP | 5,594,000 | UP | 25,881,000 |
| Total imports | 1,145,300 | DOWN | 11,200 | UP | 133,100 |

TOTAL DEMAND – ALL OILS




## Runs Need To Be Held 380,000 Bbl. Daily Below Normal This Summer

IF refiners are to work off surplus gasoline inventories this summer, refinery runs must be cut about 380,000 bbl. daily below the level that would be needed to meet forecast demands in a normal year. This estimate assumes that enough of the summer demand will be supplied from existing inventories so that primary stocks at the end of summer will be near normal.

At the end of the last week of May, gasoline inventories were up 22,000,000 bbl. compared with the same week last year, and gasoline stocks last year were considered excessive by many suppliers. The amount of last year's excess can not be measured by a comparison with the stock level in 1952, since the refinery strike in May 1952 had cut stocks to an abnormally low level. However, gasoline stocks at the end of May last year were about 18 per cent above 1951 inventories, or high enough to soften some of the gasoline markets.

**Summer reductions . . .** Adjustments in gasoline inventories should be made during the high-demand summer months. The absorption of 20,000,000 bbl. of gasoline in a period of 4 months will mean that refinery production of gasoline will have to be cut back enough to make room for about 164,000 bbl. daily from inventories in addition to the normal summer reduction in stocks. Normal reductions in gasoline stocks for the summer quarters amount to a maximum of about 30,000,000 bbl. The gravity of the problem is shown by the fact that an additional 20,000,000 bbl. should be worked off this summer.

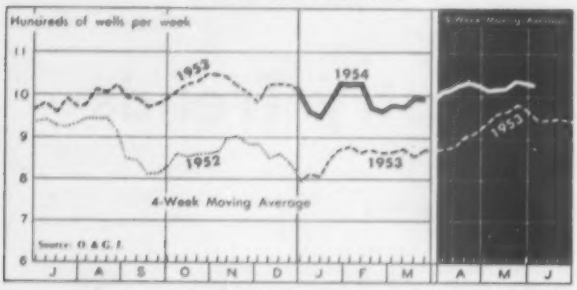
The needed reduction of about 164,000 bbl. daily in production of gasoline below the level that would be required for a normal summer can be translated into a reduction in crude runs on a basis of normal refinery yields. Considering gasoline yields from crude at about 43 per cent, refinery runs need to be held about 380,000 bbl. daily below normal this summer. Part of the reduction could be made through a cut in yields of gasoline, but there has been a general trend toward higher gasoline yields for the past few years.

**Lower realization . . .** Softer product markets have reduced refinery realization in most areas. Lower percentage yields of gasoline, the most valuable major product, would tend to reduce realization even more. On the other hand, a general reduction in crude runs will mean higher processing costs per barrel and a drop in gross profit.

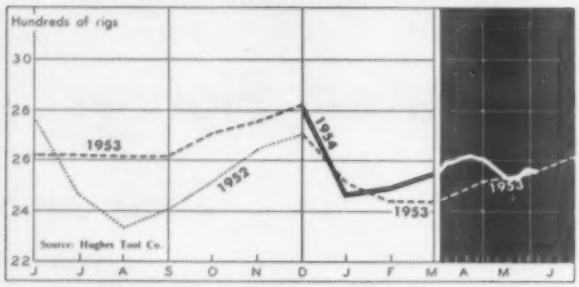
Most refiners will find it difficult to show a profit this summer comparable with that of a year ago. Product prices increased at the end of June last year following the crude-price rise. In many areas the soft product markets did not develop until later in the year. Refinery realization, for a while at least, was up about enough to cover the increase in price of crude.

Refined products on many of the markets today are selling at prices only slightly above or in some cases even below prices quoted before the increase last year. Some of the gasoline surplus must be worked off before better market prices can be expected.

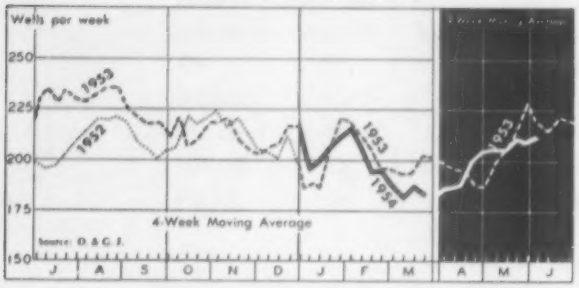
TOTAL COMPLETIONS




ROTARY RIGS OPERATING IN UNITED STATES




WILDCAT COMPLETIONS




ACTIVE ROTARY RIGS

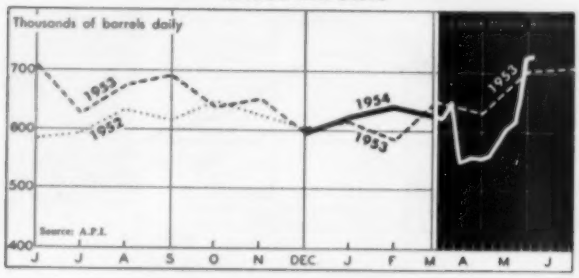
| Area— | 6-7-54 | Change from 5-31-54 | Change from 6-8-53 |
|---|---|---|---|
| Gulf Coast | 583 | 2 | —13 |
| N. and W. Texas-New Mexico | 789 | .. | —31 |
| Arkansas-N. Louisiana-E. Texas | 171 | 1 | 41 |
| Oklahoma | 333 | .. | — 7 |
| Kansas-S. Nebraska | 161 | 14 | — 9 |
| Illinois-Eastern | 144 | — 1 | 3 |
| Rocky Mountain | 252 | —11 | — 2 |
| Pacific Coast | 133 | —10 | —37 |
| Total United States | 2,566 | — 5 | —55 |
| Western Canada | 126 | 5 | —64 |

## WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 5, 1954

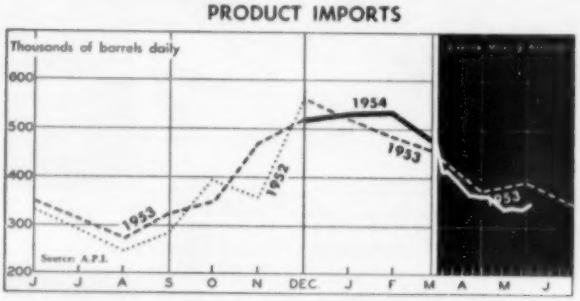
| | Total of all wells: Comp. | Oil | Gas | Dry | Footage | Cum. 1954 | Cum. 1953 | Wildcat completions and discoveries: Oil | Dist. | Gas | Dry | Total | Cumulative total, 1954: Oil | Dist. | Gas | Dry | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala.-Ga.-Fla. | 2 | 0 | 0 | 2 | 13,330 | 47 | 56 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 38 | 41 |
| Arkansas | 7 | 2 | 0 | 5 | 22,612 | 277 | 198 | 0 | 0 | 0 | 1 | 1 | 13 | 0 | 4 | 42 | 59 |
| California | 40 | 26 | 1 | 13 | 173,342 | 1,063 | 1,126 | 2 | 0 | 0 | 11 | 13 | 34 | 1 | 6 | 223 | 264 |
| Colorado | 21 | 7 | 2 | 12 | 118,948 | 547 | 227 | 1 | 0 | 2 | 11 | 14 | 17 | 0 | 2 | 201 | 220 |
| Illinois | 55 | 31 | 0 | 24 | 128,002 | 1,159 | 723 | 0 | 0 | 0 | 8 | 8 | 4 | 0 | 0 | 182 | 186 |
| Indiana | 14 | 6 | 0 | 8 | 23,918 | 341 | 499 | 1 | 0 | 0 | 1 | 2 | 5 | 0 | 0 | 76 | 81 |
| Kansas | 75 | 33 | 10 | 32 | 257,204 | 1,924 | 2,144 | 0 | 0 | 0 | 9 | 9 | 34 | 0 | 8 | 246 | 288 |
| Kentucky | 20 | 9 | 2 | 9 | 30,418 | 468 | 440 | 1 | 0 | 1 | 3 | 5 | 9 | 0 | 1 | 52 | 62 |
| Louisiana | 67 | 48 | 2 | 17 | 472,847 | 1,429 | 1,083 | 2 | 2 | 0 | 11 | 15 | 48 | 27 | 14 | 123 | 212 |
| North | 29 | 24 | 2 | 3 | 91,314 | 762 | 443 | 0 | 1 | 0 | 2 | 3 | 5 | 3 | 5 | 44 | 57 |
| South | 38 | 24 | 0 | 14 | 381,533 | 667 | 640 | 2 | 1 | 0 | 9 | 12 | 43 | 24 | 9 | 79 | 155 |
| Michigan | 4 | 2 | 0 | 2 | 10,883 | 237 | 228 | 1 | 0 | 0 | 1 | 2 | 8 | 0 | 0 | 98 | 106 |
| Mississippi | 11 | 6 | 0 | 5 | 78,147 | 167 | 153 | 0 | 0 | 0 | 2 | 2 | 3 | 0 | 0 | 58 | 61 |
| Montana | 5 | 3 | 0 | 2 | 15,743 | 116 | 164 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 31 | 32 |
| Nebraska | 6 | 4 | 0 | 2 | 34,993 | 142 | 131 | 0 | 0 | 0 | 2 | 2 | 9 | 0 | 1 | 47 | 57 |
| New Mexico | 26 | 17 | 7 | 2 | 135,677 | 458 | 593 | 0 | 0 | 1 | 2 | 3 | 8 | 0 | 6 | 56 | 70 |
| North Dakota | 10 | 3 | 0 | 7 | 63,675 | 106 | 108 | 0 | 0 | 0 | 7 | 7 | 3 | 0 | 0 | 37 | 40 |
| Ohio | 34 | 15 | 3 | 16 | 70,611 | 490 | 436 | 0 | 0 | 0 | 3 | 3 | 2 | 0 | 3 | 8 | 13 |
| Oklahoma | 193 | 113 | 8 | 72 | 697,532 | 4,033 | 3,076 | 3 | 0 | 1 | 16 | 20 | 55 | 2 | 12 | 269 | 338 |
| Pennsylvania-New York | 40 | 20 | 4 | *16 | 93,000 | 1,048 | 1,005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 15 | 19 |
| Texas | 334 | 196 | 20 | 118 | 1,520,276 | 7,752 | 7,379 | 23 | 0 | 2 | 77 | 102 | 324 | 34 | 64 | 1,775 | 2,197 |
| Southwest (1 & 4) | 57 | 37 | 3 | 17 | 255,077 | 1,110 | 1,198 | 12 | 0 | 1 | 12 | 25 | 55 | 18 | 16 | 299 | 388 |
| Gulf Coast (2 & 3) | 60 | 31 | 7 | 22 | 384,792 | 1,161 | 1,091 | 1 | 0 | 1 | 11 | 13 | 33 | 11 | 19 | 278 | 341 |
| East (5 & 6) | 33 | 13 | 7 | 13 | 173,349 | 408 | 357 | 0 | 0 | 0 | 9 | 9 | 8 | 0 | 6 | 113 | 127 |
| North Central (7-B & 9) | 114 | 56 | 0 | 58 | 342,184 | 2,916 | 2,725 | 4 | 0 | 0 | 38 | 42 | 136 | 4 | 8 | 741 | 889 |
| West (7-C & 8) | 52 | 47 | 0 | 5 | 299,793 | 1,755 | 1,650 | 6 | 0 | 0 | 5 | 11 | 92 | 0 | 10 | 306 | 408 |
| Panhandle (10) | 18 | 12 | 3 | 3 | 65,081 | 402 | 358 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 5 | 38 | 44 |
| Utah | 1 | 0 | 0 | 1 | 8,934 | 28 | 33 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 14 | 17 |
| West Virginia | 6 | 1 | 5 | 0 | 16,480 | 226 | 245 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 7 | 19 |
| Wyoming | 14 | 10 | 0 | 4 | 76,621 | 596 | 257 | 0 | 0 | 0 | 1 | 1 | 22 | 0 | 3 | 78 | 103 |
| Miscellaneous | 0 | 0 | 0 | 0 | 0 | 76 | 23 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 10 | 11 |
| Total United States | **985** | 552 | 64 | 369 | 4,063,193 | 22,730 | 20,327 | 34 | 2 | 7 | 166 | **209** | 604 | 64 | 142 | 3,686 | 4,496 |
| Total previous week | 992 | 567 | 81 | 344 | 3,855,646 | | | 42 | 6 | 9 | 136 | 193 | 570 | 62 | 135 | 3,520 | 4,287 |
| Total June 6, 1953 | 884 | 452 | 81 | 351 | 3,621,352 | | | 28 | 2 | 4 | 161 | 195 | 606 | 40 | 166 | 3,752 | 4,564 |

Service wells included: *18.

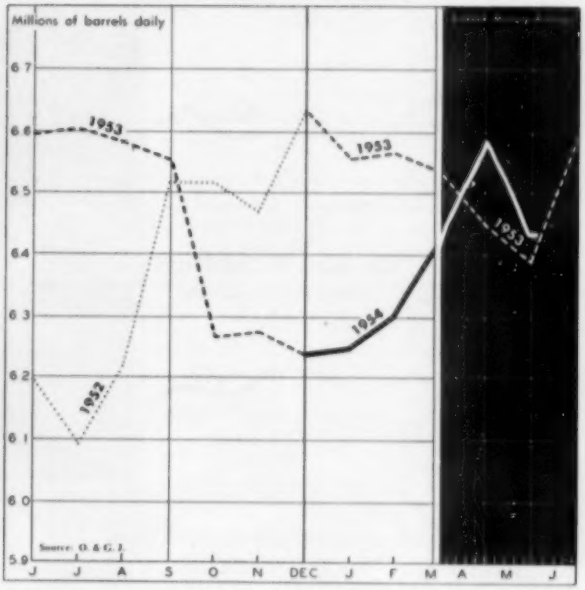
## CRUDE IMPORTS




## PRODUCT IMPORTS




## CRUDE-OIL PRODUCTION

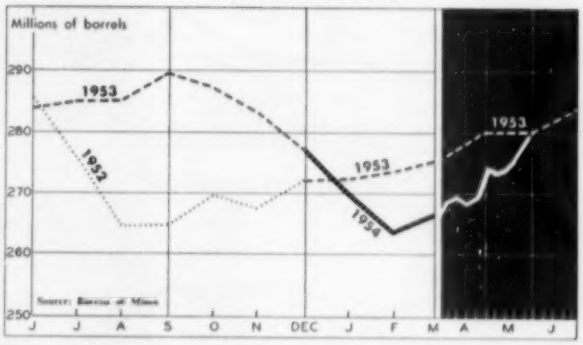



## DAILY AVERAGE PRODUCTION FOR WEEK

| | June 5 | | | May 29 |
|---|---|---|---|---|
| | Crude oil | Lease condensate | Total | total |
| Alabama | 4,300 | | 4,300 | 4,400 |
| Arkansas | 76,400 | 550 | 76,950 | 77,600 |
| California | 987,500 | | 987,500 | 990,200 |
| Colorado | 123,800 | | 123,800 | 125,800 |
| Eastern | 54,000 | | 54,000 | 54,500 |
| Florida | 1,650 | | 1,650 | 1,650 |
| Illinois | 181,400 | | 181,400 | 185,400 |
| Indiana | 30,100 | | 30,100 | 30,400 |
| Kansas | 325,800 | | 325,800 | 329,200 |
| Kentucky | 37,700 | | 37,700 | 37,600 |
| Louisiana | 666,875 | 43,600 | 710,475 | 712,900 |
| North | 108,300 | 3,600 | 111,900 | 112,400 |
| South | 558,575 | 40,000 | 598,575 | 600,500 |
| Michigan | 37,100 | | 37,100 | 37,300 |
| Mississippi | 89,050 | 3,300 | 92,350 | 92,500 |
| Montana | 36,100 | | 36,100 | 34,800 |
| Nebraska | 19,300 | | 19,300 | 20,300 |
| New Mexico | 204,900 | 1,750 | 206,650 | 205,700 |
| North Dakota | †14,900 | | 14,900 | 15,100 |
| Oklahoma | 498,000 | | 498,000 | 539,500 |
| Texas | 2,701,075 | 50,000 | 2,751,075 | 2,690,550 |
| Dist. 1 | 43,075 | 400 | 43,475 | 41,925 |
| Dist. 2 | 142,225 | 7,100 | 149,325 | 146,200 |
| Dist. 3 | 429,425 | 24,250 | 453,675 | 440,250 |
| Dist. 4 | 245,700 | 5,850 | 251,550 | 246,000 |
| Dist. 5 | 45,225 | 450 | 45,675 | 44,450 |
| Dist. 6 | 112,575 | 5,200 | 117,775 | 114,200 |
| East Texas field | 234,150 | | 234,150 | 229,500 |
| Dist. 7-B | 119,200 | 25 | 119,225 | 119,050 |
| Dist. 7-C | 183,425 | 4,600 | 188,025 | 182,750 |
| Dist. 8 | 874,500 | 1,700 | 876,200 | 857,700 |
| Dist. 9 | 191,575 | 400 | 191,975 | 188,500 |
| Dist. 10 | 80,000 | 25 | 80,025 | 80,025 |
| Utah | 5,500 | | 5,500 | 5,700 |
| Wyoming | 241,600 | | 241,600 | 245,500 |
| Total U. S. | 6,337,050 | 99,200 | **6,436,250** | 6,436,600 |
| Change from previous week, down | | | **350** | |
| Canada | 210,050 | | 210,050 | 255,825 |
| Total U. S. production January 1-June 5 | | | 1,002,622,100 bbl. | |
| Same period last year (crude plus cond.) | | | *1,013,769,160 bbl. | |

*Includes 14,561,675 bbl. condensate. †Includes South Dakota 100 bbl. daily.

## CRUDE-OIL STOCKS



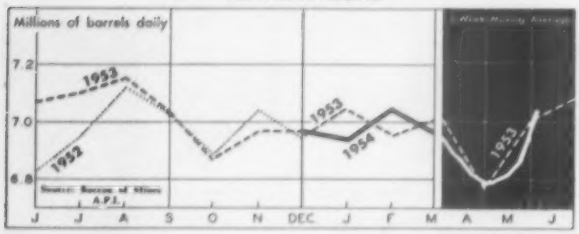

## CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

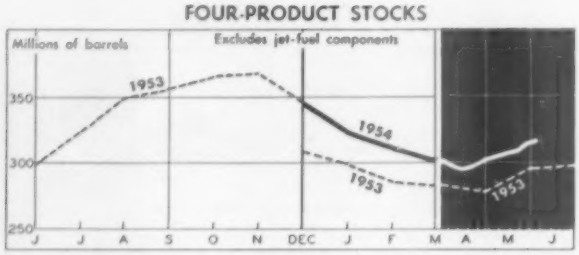
| | May 29, '54 | May 22, '54 | May 30, '53 |
|---|---|---|---|
| Pennsylvania Grade | 3,237 | 3,279 | 2,543 |
| Other Appalachian | 1,849 | 1,938 | 2,231 |
| Illinois, Indiana, Michigan | 12,655 | 12,412 | 12,045 |
| Kansas | 10,144 | 10,022 | 10,073 |
| Oklahoma | 28,687 | 27,412 | 29,460 |
| Arkansas | 3,185 | 3,233 | 2,770 |
| Louisiana | 16,257 | 16,196 | 16,552 |
| North | 2,459 | 2,505 | 2,738 |
| Gulf | 13,798 | 13,691 | 13,814 |
| Mississippi | 3,177 | 3,284 | 3,801 |
| New Mexico | 7,222 | 6,868 | 7,215 |
| Texas | 128,068 | 128,616 | 132,852 |
| East Texas proper | 12,163 | 11,973 | 11,620 |
| West Texas | 54,857 | 55,986 | 62,616 |
| Texas Gulf | 27,863 | 27,303 | 25,628 |
| Other Texas | 33,185 | 33,354 | 32,988 |
| Wyoming | 14,282 | 14,509 | 14,473 |
| Other Rocky Mountain | 4,082 | 4,126 | 3,696 |
| California | 33,039 | 32,787 | 34,988 |
| Foreign | †13,372 | 11,227 | 7,982 |
| Total | 279,256 | 275,909 | 280,681 |

*Bureau of Mines. †Includes 3,080,000 bbl. in California.

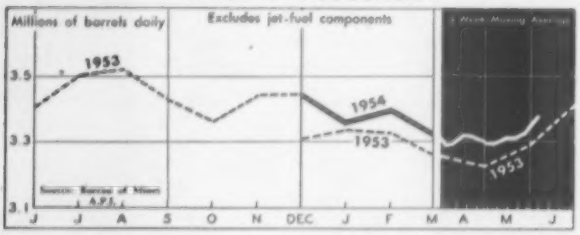
REFINERY RUNS



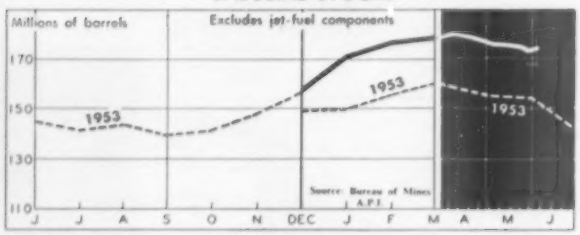

FOUR-PRODUCT STOCKS



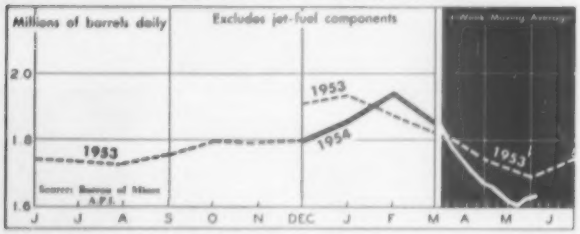

GASOLINE PRODUCTION



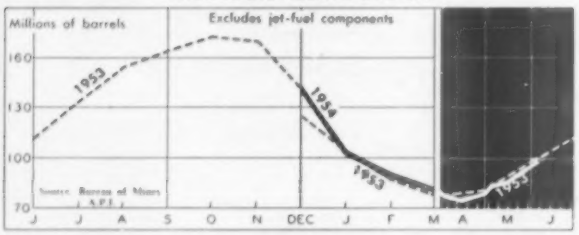

GASOLINE STOCKS



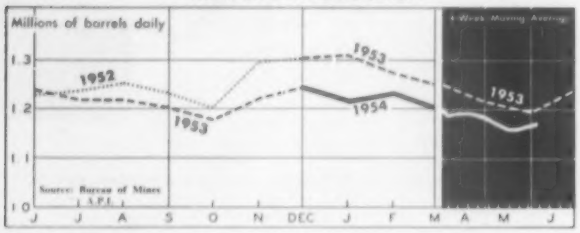

MIDDLE-DISTILLATE PRODUCTION



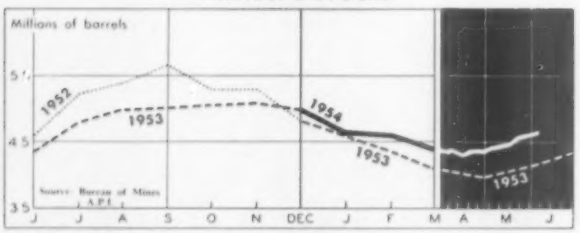

MIDDLE-DISTILLATE STOCKS




RESIDUAL PRODUCTION




RESIDUAL STOCKS




## A.P.I. REFINERY REPORT, JUNE 5

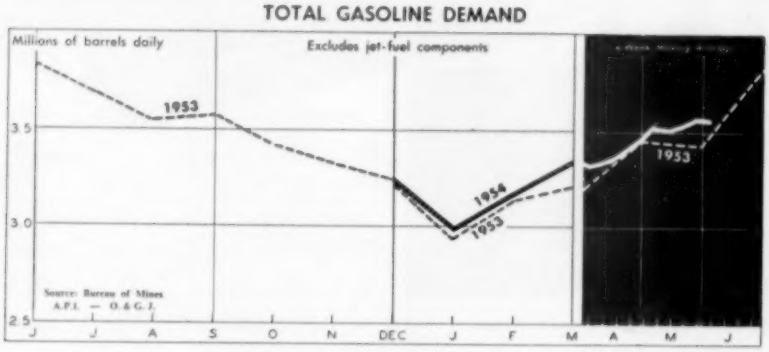
**(Excludes all jet-fuel components)**

(Thousands of barrels)

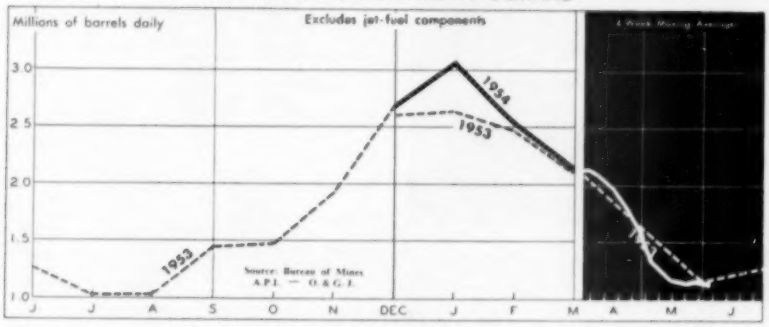
| District— | Daily avg. runs | Daily average production—Gaso.* | Kero. | Dist. | Resid. | Stocks‡—Gaso.† | Kero. | Dist. | Resid. | Bureau of Mines, June 1953—Daily avg. runs | Daily average production—Gaso.* | Kero. | Dist. | Resid. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Coast | 1,045 | 427.4 | 31.6 | 224.6 | 202.1 | 37,457 | 9,691 | 24,140 | 9,148 | 1,077 | 419.4 | 37.2 | 256.9 | 240.5 |
| Appalachian: | | | | | | | | | | | | | | |
| District 1 | 110 | 49.2 | 2.9 | 23.3 | 11.1 | 4,432 | 414 | 1,287 | 504 | 108 | 45.3 | 4.8 | 18.1 | 13.8 |
| District 2 | 94 | 51.3 | 5.7 | 9.3 | 10.4 | 2,771 | 373 | 679 | 336 | 90 | 45.1 | 5.2 | 11.3 | 12.1 |
| Ind., Ill., Ky. | 1,315 | 688.7 | 73.8 | 247.4 | 180.6 | 38,295 | 5,336 | 13,568 | 4,267 | 1,252 | 668.8 | 70.6 | 211.3 | 162.8 |
| Okla., Kans., Mo. | 634 | 347.6 | 9.1 | 133.8 | 43.1 | 18,072 | 1,382 | 8,242 | 1,314 | 630 | 353.0 | 18.3 | 146.6 | 45.4 |
| Inland Texas | 248 | 179.4 | 10.4 | 41.0 | 26.0 | 7,166 | 377 | 1,394 | 1,369 | 258 | 169.4 | 9.5 | 44.0 | 33.3 |
| Texas Gulf Coast | 1,685 | 779.0 | 69.0 | 351.7 | 224.9 | 22,413 | 3,381 | 7,914 | 4,174 | 1,710 | 811.4 | 104.2 | 393.0 | 255.3 |
| La. Gulf Coast | 560 | 283.0 | 51.3 | 136.9 | 45.9 | 8,921 | 2,140 | 3,605 | 1,261 | 579 | 290.3 | 40.3 | 144.9 | 57.2 |
| N. La. and Ark. | 80 | 37.4 | 8.6 | 14.9 | 7.0 | 3,891 | 822 | 885 | 209 | 87 | 31.2 | 7.2 | 21.7 | 7.1 |
| Rocky Mountain: | | | | | | | | | | | | | | |
| New Mexico | 19 | 12.1 | 1.0 | 3.0 | 2.9 | 219 | | 65 | 41 | 20 | 12.6 | 0.4 | 3.0 | 4.1 |
| Other Rocky Mtn. | 244 | 121.9 | 5.0 | 54.7 | 32.3 | 8,202 | 211 | 2,099 | 874 | 239 | 113.1 | 2.5 | 52.1 | 42.0 |
| California | 1,110 | 474.4 | 7.7 | 163.0 | 374.8 | 21,865 | 432 | 10,879 | 23,005 | 1,031 | 450.2 | 6.5 | 137.5 | 364.8 |
| June 5, 1954 | 7,144 | 3,451.4 | 276.1 | 1,403.6 | 1,161.1 | 173,704 | 24,559 | 74,757 | 46,502 | 7,081 | 3,409.8 | 306.7 | 1,440.4 | 1,238.4 |
| May 29, 1954 | 7,020 | §3,273.4 | 333.7 | 1,351.3 | 1,184.7 | 172,855 | 23,416 | 71,224 | 46,433 | | | | | |
| June 6, 1953 | 7,168 | 3,475.7 | 281.6 | 1,569.0 | 1,187.4 | 151,045 | 23,676 | 76,467 | 42,453 | | | | | |

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines. §Revised.

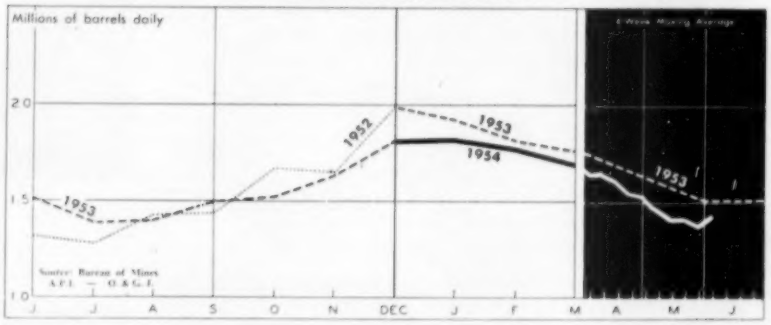
## TOTAL GASOLINE DEMAND




## TOTAL MIDDLE-DISTILLATE DEMAND




## TOTAL RESIDUAL DEMAND




## REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of June 9, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

### GASOLINE, KEROSINE, AND FUEL OILS

| | Mid-Continent Group 3 | New York Harbor (barge) | Texas Gulf Coast |
|---|---|---|---|
| Regular gasoline | 10.75-11 | 11.5-12.25 | 10.25-10.5 |
| Premium gasoline | 11.75-12 | 13.25-14 | 11.5-12.0 |
| 42-44 w.w. kerosine | 9-9.25 | 9.85-9.95 | 9 |
| No. 2 straw fuel oil | 8.125-8.25 | 8.85-8.95 | 8 |
| No. 6 residual | $0.95-1.10 | $2.20-2.40 | $1.85-1.95 |

### NATURAL GASOLINE

| | Group 3 | North Texas | N. La. |
|---|---|---|---|
| Grade 26-70 | 4.5 | 4.0 | 4.25 |
| Grade 18-55 | 5.4 | 4.9 | 5.15 |

### LUBRICATING OILS

**Mid-Continent**

| | |
|---|---|
| 150-160 vis., D bright stock, 0-10 pp. | 18 |
| 200 vis., No. 3 neutral, 0-10 pp. | 13.25 |

### WAX

**Mid-Continent**

| | |
|---|---|
| 132-134 A.M.P. | 6.0 |

• Distillate prices have eased slightly in some areas on the East Coast, particularly in New Jersey. The Standard Oil Co. (Ohio) announced a reduction in tank-wagon prices for gasoline in its marketing territory amounting to 0.7 cent a gallon.

### PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

| | Refinery prod. | Total demand |
|---|---|---|
| Gasoline: | | |
| Four weeks ended 6-5-54 | 3,374 | 3,563 |
| March 1954 | 3,261 | 3,321 |
| February 1954 | 3,365 | 3,182 |
| June 1953 | 3,410 | 3,838 |
| Middle distillate: | | |
| Four weeks ended 6-5-54 | 1,632 | 1,111 |
| March 1954 | 1,811 | 2,240 |
| February 1954 | 1,957 | 2,417 |
| June 1953 | 1,747 | 1,280 |
| Residual fuel: | | |
| Four weeks ended 6-5-54 | 1,172 | 1,435 |
| March 1954 | 1,169 | 1,667 |
| February 1954 | 1,241 | 1,753 |
| June 1953 | 1,238 | 1,506 |

### CRUDE PRICES GRAVITY SCHEDULE

| | Signal Hill, Calif.* | Oklahoma, Kansas | Gulf Coast Tex.† | West Tex.‡ |
|---|---|---|---|---|
| 14-14.9 | $1.87 | | | |
| 15-15.9 | 1.93 | | | |
| 16-16.9 | 1.99 | | | |
| 17-17.9 | 2.05 | | | |
| 18-18.9 | 2.11 | | | |
| 19-19.9 | 2.18 | | | |
| 20-20.9 | 2.24 | $2.50 | | $2.37 |
| 21-21.9 | 2.30 | 2.52 | | 2.39 |
| 22-22.9 | 2.37 | 2.54 | | 2.41 |
| 23-23.9 | 2.45 | 2.56 | | 2.43 |
| 24-24.9 | 2.53 | 2.58 | $2.91 | 2.45 |
| 25-25.9 | 2.61 | 2.60 | 2.93 | 2.47 |
| 26-26.9 | 2.69 | 2.62 | 2.95 | 2.49 |
| 27-27.9 | 2.76 | 2.64 | 2.97 | 2.51 |
| 28-28.9 | 2.83 | 2.66 | 2.99 | 2.53 |
| 29-29.9 | 2.91 | 2.68 | 3.01 | 2.55 |
| 30-30.9 | 2.97 | 2.70 | 3.03 | 2.57 |
| 31-31.9 | 3.04 | 2.72 | 3.05 | 2.59 |
| 32-32.9 | 3.12 | 2.74 | 3.07 | 2.61 |
| 33-33.9 | | 2.76 | 3.09 | 2.63 |
| 34-34.9 | | 2.78 | 3.11 | 2.65 |
| 35-35.9 | | 2.80 | 3.13 | 2.67 |
| 36-36.9 | | 2.82 | 3.15 | 2.69 |
| 37-37.9 | | 2.84 | 3.17 | 2.71 |
| 38-38.9 | | 2.86 | 3.19 | 2.73 |
| 39-39.9 | | 2.88 | 3.21 | 2.75 |
| 40 and above | | 2.90 | 3.23 | 2.77 |

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

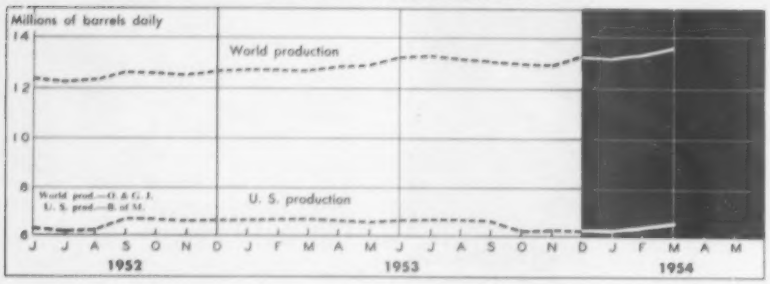
Prices east of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective May 20, 1954.

### FLAT CRUDE PRICES

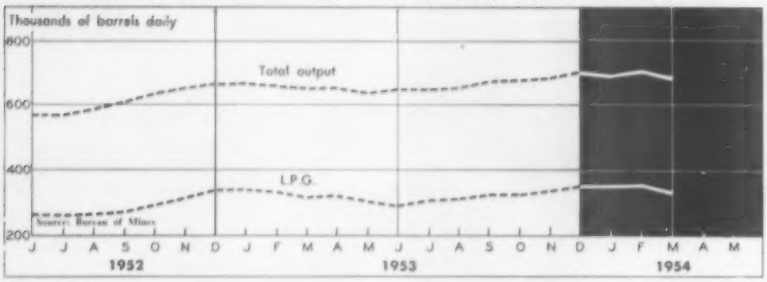
Representative posted schedules per barrel.

| | |
|---|---|
| Louisiana: | |
| Cotton Valley (distillate) | $3.00 |
| Cotton Valley (Holloway crude) | 2.95 |
| Texas: | |
| East Texas | 2.90 |
| Chapel Hill | 2.83 |
| Conroe | 3.13 |
| Van | 2.73 |
| Pennsylvania Grade: | |
| Bradford | 3.00-3.26 |
| Middle District | 3.20 |
| Southwest Pennsylvania | 2.81 |
| West Virginia | 2.75 |
| Ohio | 2.74 |
| Illinois Basin | 3.02 |

## CRUDE-OIL PRODUCTION




## NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION




### CRUDE PRODUCTION

(Thousands of barrels daily)

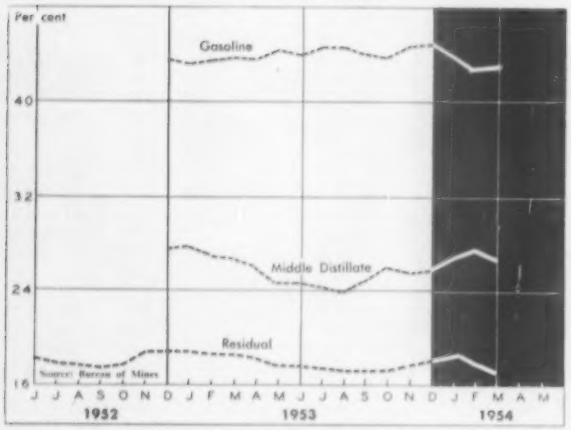
| Month— | U. S. | World |
|---|---|---|
| March 1954 | 6,507 | 13,643 |
| February 1954 | 6,379 | 13,365 |
| January 1954 | 6,240 | 13,168 |
| September 1953 | 6,557 | 13,157 |
| March 1953 | 6,531 | 12,842 |

### PRODUCTION AT NATURAL-GASOLINE AND CYCLING PLANTS

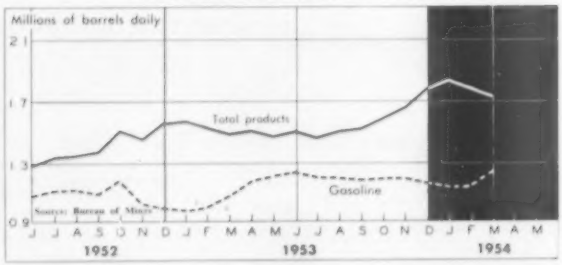
(Thousands of barrels daily)

| Month— | L.P.G. | Total |
|---|---|---|
| March 1954 | 332 | 682 |
| February 1954 | 356 | 705 |
| January 1954 | 355 | 688 |
| September 1953 | 317 | 674 |
| March 1953 | 313 | 652 |

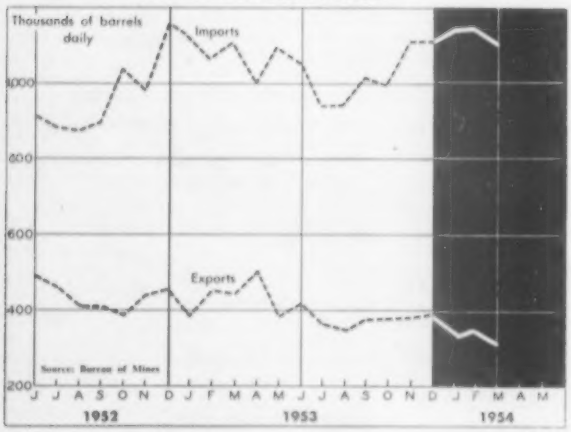
## REFINERY YIELDS



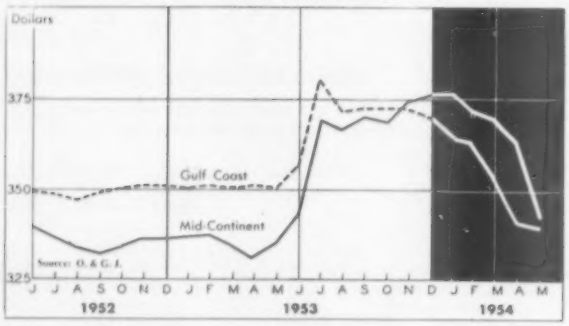

## PRODUCTS DELIVERED BY PIPELINE




## IMPORTS-EXPORTS




## REFINERY REALIZATION




### REFINERY REALIZATION

| | May 1954 | Apr. 1954 | Mar. 1954 | May 1953 |
|---|---|---|---|---|
| Mid-Continent | $3.41 | $3.63 | $3.59 | $3.34 |
| Gulf Coast | 3.39 | 3.40 | 3.47 | 3.50 |

**Refinery realization is based on yields of major products and average spot prices for regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.**

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WILSON GIANT—Serial No. 6383. Sales Price—$6,000. Equipped with Two Waukesha 145 GK Engines in good condition. General Appearance—Fair. Rig used for Work-Over. Price includes Kelco Spinning and Foster Breakout Catheads; Stromberg - McCreary Air Starters on Engines. Brakes circulating water-cooled; Manual Friction Clutches in Transmission; Others — Jaw Clutches. Rig has Slush Pump Drive and Rotary Drive. Location of Unit—Lake Charles, Louisiana. Contact Cardwell, Houston.

FOR SALE: Model KL 153 Cardwell double drum drilling in unit with UD 24 diesel International engine, Brown-Lipe 4-speed transmission, double pole mast, complete with tools and other equipment. Drilling near Independence, Kansas—THE VEEDER SUPPLY & DEVELOPMENT CO., Cherryvale, Kansas.

NEW 16" Nordstrom 300# Plug Valves Figure 4249 Original crates, $750 each. Also 12", 10" and Smaller at fraction of original cost. Refinery Materials Company, P. O. Box 14306, Houston 21, Texas.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

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## FOR SALE EQUIPMENT

MODEL H CARDWELL Servicing Unit. Truck mounted with mast. Fully equipped. Box No. 1 or Phone 153, Canton, Kansas.

FRANKS ETS-500—Single Drum Hoist Less Engine. Sales Price—$1,500. General Appearance — Good. Unit complete with Franks Power Take-Off; Mounted on Steel and Wood Truck Bed. Location of Unit—Winfield, Kansas. Contact Cardwell, Wichita.

FRANKS MODEL 5000 Spudder — Serial No. 866. Sales Price—$7,500. Equipped with one Cummins HB1-600 Engine in good condition. Brake Rims in fair condition; Brake blocks—Good. General appearance—Good. Chains—Good. Basic Machine equipped with Spudding attachment, Skid and 65' Double Leg Pipe Mast with 8⅝" and 7" Pipe Legs; 4-Sheave Crown of Wilson Manufacture. Price includes Mast Guy Lines. Location of Unit — Western Kansas. Contact Cardwell, Wichita.

FOR SALE: 12,000' 4" o.d. seamless line pipe. 40' random lengths. Clean inside and out. Beveled ready to lay 35c f.o.b. our yard. M. J. Regan Pipe Co., Coffeyville, Kans.

WILSON ATLAS. Sales Price—$21,000.00. Equipped with two L1-600 Cummins Diesel Engines in good condition: includes pump drive, 12 PD groove sheave and V-belts. One American cathead and one plain spool cathead. Compound enclosed oil-bath. Includes one 1000 gal. fuel tank. Contact Cardwell, Houston.

FOR SALE: Model "K" Cardwell tubing and rod unit complete with tubing and rod tools, mast, mounted on Ford tandem truck. Melco Drilling Company, Seminole, Oklahoma.

**SPECIAL LIQUIDATION**

TOWERS AND COLUMNS

1—8' O.D. x 61' 6" SS, 15 trays 50#, 300° F.
1—7' 6" O.D. x 55' 6" steel, 30 trays 45#, 300° F.
1—7' I.D. x 42' steel, 20 trays 40#, 150° F.
1—7' I.D. x 25' 6" SS, 10 trays, 50#, 250° F.
1—6' I.D. x 64' steel, 35 trays, 55#, 300° F.
1—6' I.D. x 45' SS, 15 trays, 850#, 350° F.
1—5' O.D. x 61' 6" steel, 15 trays, 55#, 300° F.
1—4' O.D. x 72' SS, 40 trays, 75#, 300° F.
1—3' 6" I.D. x 63' steel, 35 trays, 55#, 250° F.
1—2' 6" I.D. x 60' steel, 35 trays, 55#, 300° F.
1—2' O.D. x 75' steel, 45 trays, 55#, 300° F.
1—2' I.D. x 39' SS, 40 trays, 70#, 300° F.

HEAT EXCHANGERS-CONDENSERS

2—1440 sq. ft. 304 S.S. 75# PSIG, 350° F.
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FOR SALE: Mayhew Rotary Drill, A-1 shape, completely equipped to drill & complete oil wells, also water truck with or without drill stem. Call Gilcrease at 2575-J, Coffeyville, Kansas, or Martin at Amherst 5-5229, Wichita, Kansas.

DRILLING equipment. New and used spudders, rotaries, tools. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colorado.

2—MOGUL Wilson draw works casing pulling rigs complete with Thrift pump, mud pump and tools. 1—Super Wilson draw works rig with same as above. 1—Stripped down Wilson Super draw works with motor only. Very cheap. 1—1946, 7½ ton White Truck. 2—GMC ¾ Ton Pickups. 1—1 ton Intl. Pickup. 1—8⅝" Landis Pipe Machine. 1—McFarland Pipe Tester. 1—Large assortment Fishing Tools. 3 — Steel Warehouse Buildings and Office. 7—Large City Lots. 1—50' Fairbanks-Morse Scales. To inspect contact Joe B. Skeen at Acme Pipe & Supply Co., Overton, Texas. Box 1063. Tel. 4621.

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FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

SEISMIC EQUIPMENT:
Two Mayhew 1000 Heavy duty drill, 5 x 6 pumps; mounted on GMC Trucks, with two water Tank Trucks mounted on GMC Trucks, like new. S. I. E. 24-trace recorder with jugs; shooter's truck; reel truck; two surveyors pickup trucks; station wagon; two alidades; dynamite trailer—all in excellent condition. Never used on contract jobs. Going out of seismic business. Will sell for half invoice prices. Phone 2-1783, McCarty & Coleman, 506 First National Bank Building, Wichita Falls, Texas.

4—55,000 BARREL Tanks, 2 fabricated for immediate erection. S. S. Staley, Jr., Box 5885, Phone EMerson 6947, Dallas, Texas.

FOR RENT, sale or rental purchase: 1 TD18A, Serial 23635 equipped with PBI-18 Pipeboom; 1 LS51 Speeder backhoe and dragline, Serial 6G152; 1 25 bbl. CRC paint kettle with agitator on Athey tracks. Knupp Construction Co., Box 152, Great Bend, Kansas, Phone 3528.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C.; 2 unused, 1 slightly used. 11—Sperry 18" x 18" cast iron Filter Presses, 11 chambers. Consolidated Products Co. Inc., #65 Garden Street, Hoboken, N. J. N.Y. Tel.: BArclay 7-0600.

TWO GARDNER-DENVER Slush Pumps, 5" x 8". Priced to sell. Located at Independence, Kansas, contact Mountain Iron and Supply, L-D 229, Wichita, Kansas.

## EQUIPMENT WANTED

WANTED: 30,000 pound package type boiler, 150 psig. N. W. Refining Co., St. Paul Park, Minnesota.

WANTED: 250 sets 2⅞" Reg. Tool Jts. for internal upset pipe. Penick Supply, Pho. 1229, Monahans, Tex.

WANTED: Fractionating column, 8 foot by 70 foot; Vacuum tower, 8 foot by 50; Fractionating column, 3 foot by 25 foot to 30 foot. Address replies to: George J. Chor, Purchasing Agent, N. W. Refining Co., St. Paul Park, Minnesota.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

## MATERIAL WANTED

One 13⅝" Shaffer Blowout Preventer Type 39. One 16¾" Shaffer Blowout Preventer, Type 39.

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## HELP WANTED

MAJOR OIL COMPANY with Southern Oklahoma Refinery has an opening for a Senior Engineer well experienced in technical service work, with major emphasis on fluid catalytic cracking. Duties will consist of technical advisory work to operating supervision and making economic studies on various operating units. Applicant must be a college graduate in refining or chemical engineering. Give experience and salary required. Box H-231, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

**DRILLING REPRESENTATIVE**
Major drilling company has opening July 1 for contact and public relations man in Mid-Continent Area, between ages of 30 and 40. Must be well acquainted with oil fraternity and have good personality. Drilling experience desirable. Must be able to furnish excellent references, past employment record, and educational background. Good position for right party. Box H-242, The Oil and Gas Journal, Tulsa, Oklahoma.

## HELP WANTED

SALES REPRESENTATIVES WANTED
Manufacturer of Oil and Gas Separating, Treating and Metering Equipment wants commission Sales Representatives for (1) North Texas, (2) South Texas, (3) South Louisiana, (4) Williston Basin, (5) Illinois, Indiana, and Kentucky. Territories available on exclusive contract basis to qualified salesmen. Please give details concerning present sales coverage, lines handled, and sales personnel when answering. Box H-240, The Oil and Gas Journal, Tulsa, Oklahoma.

PROCESS ENGINEER
Excellent opportunity in Midwest for young man 25 to 45 with B.S. or equivalent in chemical engineering. General experience in distillation, light ends separations and absorber design desirable. Would participate in new tray design and development. Box H-225, The Oil and Gas Journal, Tulsa, Oklahoma.

THE SUPERIOR OIL COMPANY has an opening in the Geophysical Department, starting as a computer. College degree in Geology, Geological or Petroleum Engineering required plus math through calculus and basic physics. No experience required. Send transcript, photo and letter of application to Personnel Department, The Superior Oil Company, Midland, Texas.

## PRODUCTION MAN

AGE 40-50; field experience in 6000-7000 ft. wells. Opening with independent producer North Texas. References and qualifications first letter.

**P. O. Box 1824,**
**Oklahoma City, Oklahoma**

## HELP WANTED

PETROLEUM ENGINEERS: Major oil company in South America has varied positions for single graduate engineers. Must have minimum one year each production and engineering experience. Reply giving full details—age, experience, college, military status, etc. Box H-228, The Oil and Gas Journal, Tulsa, Oklahoma.

## GEOLOGISTS

Major company beginning exploration program in Egypt is accepting applications for the following geological positions:

Research Geologist—regional and local stratigraphic studies; knowledge of micropaleontology; 4 or more years of experience, preferably including foreign.

Photogeologist — experienced in geological interpretation of air photos.

Surface Geologists (3) — 2 or more years of experience in surface mapping.

Junior Geologists (3)—for surface mapping; little or no experience necessary.

Seismograph Geologists (2)—some experience in subsurface and geophysical operations.

Reply, stating qualifications and experence, to:

**Box H-216**

**THE OIL AND GAS JOURNAL**

**Tulsa, Oklahoma**

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**located in South America**
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**OIL REFINERY ENGINEERS**

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Assignments will include economic studies and preparation of refinery operating programs. Experience using statistical methods desirable.

**ELECTRICAL ENGINEERS**
Graduate engineers with several years electrical design experience required. Will design electrical installations, including transmission, distribution, control, lighting, and communications systems.

**MECHANICAL ENGINEERS**
Work assignments will include piping, pressure vessel, pumping, and heat exchange equipment design. Knowledge of cost estimating, material specifications and quantity take off required.

**INSPECTION ENGINEERS**
Engineering degree and several years oil refinery metals inspection experience. Will inspect oil refinery equipment and request equipment renewals where corrosion, failure, or defectiveness under safety codes makes necessary.

These are regular staff positions offering liberal salaries and benefit plans.

**WRITE**

giving complete address, age, marital status, education, and details of previous experience. Box 308-T, Radio City Station, New York 19, N. Y.

## HELP WANTED

SALES ENGINEER—for Gulf Coast Area. Experience in refinery operation essential. Salary and expenses plus commission and other company benefits. Address Vice President, Sales, The J. B. Beaird Company, Inc., Post Office Box 1115, Shreveport, Louisiana.

### ACCOUNTANT

Accountant with oil refinery experience, including product costing, for position of chief accountant with new 25,000 bbl. per day refinery now under construction at St. Paul, Minnesota. In reply give complete resume, including education, experience and salary desired. All replies confidential. Write Great Northern Oil Company, P.O. Box 3596, St. Paul 1, Minn.

### PETROLEUM OR RESERVOIR ENGINEER

With minimum 3 years experience in development, production and oil and gas reservoir engineering on primary and secondary recovery problems. For New York office of major foreign producer.

### MICROPALEONTOLOGIST

Preferably with an advanced degree and a minimum of 5 years' commercial or academic experience. To work in New York research laboratory. This position demands broad interests in Stratigraphy and Biofacies and the capacity to do independent work on projects assigned.

Salary for above positions dependent on experience and qualifications. Write giving full particulars regarding personal history and work experience. Please include telephone number.

### RECRUITING SUPERVISOR
### BOX OGJ-11

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**505 Park Avenue**
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### SALESMAN WANTED

Large national paint manufacturer desires aggressive manufacturer's agent with good contacts to sell line of top quality maintenance paints to industrial plants in the Southwest area. Straight commission. Excellent opportunity. For full information and details write

**Box H-237**
**The Oil and Gas Journal**
**Tulsa, Oklahoma**

## HELP WANTED

GRADUATE Petroleum Engineer with minimum of four years experience in reservoir studies, calculations and expected life of reserves, and computation of economics by major oil company headquarters Tulsa. State experience and qualifications Box 521, Tulsa, Oklahoma.

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These men will report directly to the Refinery Manager. Salaries will be consistent with experience and responsibility of the positions. State details of experience, education, personal data, and salary requirements in first letter.

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## REAL ESTATE

FOR LEASE at Liberal, Kansas. Attractive new building, masonry construction. Loading dock. Located on 3½ acre tract. Edge of Liberal. Will divide. H. J. Demmin, Phone 3362 or write c/o General Delivery, Liberal, Kansas.

### TOOL YARD

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**Oklahoma City, Oklahoma**

## SITUATIONS WANTED

CHIEF PETROLEUM ENGINEER: Major company, South America. Production geology and petroleum engineering background, B.S., 37. Have handled important technical and administrative duties for many years. Want job with sound, efficiently managed company, U.S.A. or Canada. Box H-209, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING-PRODUCTION-COMPLETION SUPERINTENDENT, 7½ years' major company experience. Engineering background. Currently employed as Production Superintendent by independent producer desires to make a change. Age 37, married. Box H-223, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY SUPERINTENDENT—30 to 45, degree in chemical or mechanical engineering or physical chemistry. Minimum of five years refinery experience in major supervisory capacity. Experience handling asphalt and/or middle of the barrel petroleum products. Excellent ability for handling personnel essential. West Coast Operation. Box H-227, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL ACCOUNTANT desires position with independent operator. Experienced in office management, taxes, insurance, finance. Can take full responsibility of office and assume administrative duties. Replies strictly confidential. Box H-215, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY ENGINEER: 6 years' experience in maintenance, design, and construction of Fluid and Thermofor Cat Crackers and Auxiliaries. Desire contact with refiner or contractor. Box H-218, The Oil and Gas Journal, Tulsa, Oklahoma.

SUBSURFACE Geologist in Tulsa, 30, married, 4 years subsurface and surface experience with major and independent, desires permanent position with aggressive independent or consultant. Box H-224, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628. Ph. No. 3-3141, Hobbs, New Mexico.

MINING ENGINEERING Graduate, 34, 5 years oil exploration, 3 years mining, 4 years civil. Desires position offering maximum use of experience. Excellent references in responsible positions. Box H-243, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT: 21 years' experience in production engineering and supervision with one major company. Last served as production superintendent. Will relocate for right position. Box H-236, The Oil and Gas Journal, Tulsa, Oklahoma.

FIELD SUPERINTENDENT: 37, Married, B.S. degree. In charge of drilling, production, maintenance of our family-owned properties in Penn Grade region past 9 years. Commercial pilot of light planes since 1942. Box H-241, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE—GENERAL MANAGER
Experienced refinery and mechanical engineer and superintendent-sales executive. Experience covers all phases sales, engineering, manufacturing of processing equipment, labor negotiations, refinery operations, and construction. Box H-242, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGY GRADUATE: Eleven years seismic experience Gulf Coast and Rocky Mountain Area. Desires geologic position with producing oil company. Box H-239, The Oil and Gas Journal, Tulsa, Oklahoma.

SCOUT-LANDMAN, married, degree, references, now working major company Gulf Coast, desires change Rocky Mountain area. Box H-238, The Oil and Gas Journal, Tulsa, Oklahoma.

**YOUNG MAN, Holland-American background, with widespread contacts, and whose experience as landman, oil company executive and independent particularly fits him to new or expanding operations, seeks association with enterprising individual or company. Can offer unusual talents for unusual job.**

**Box H-233, The Oil and Gas Journal, Tulsa, Oklahoma**

**ROYALTIES**

OIL ROYALTY
In Colorado's Hot Spot, Weld County; will sell up to 100 Ac. Personally owned minerals under Major Co.'s lease. Perpetual Partic. Also an attractive lease in their block. Guy J. Stumpff, Pet. Eng., Box 278, Aurora Br., Denver, Colo.

JACK EAGLE, Oil Properties, 706 City Nat'l Bldg., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

**LEASE AND DRILLING BLOCKS**

OPERATOR wanted to drill Tennessee acreage over Oil-Gas seepage territory. Valuable gas market adjacent. E. A. Munyan, 102 Fairview Drive, Fairfax, Va.

FOR SALE: MONTANA MINERAL INTERESTS: Lower price range, well located. Good return from lease rentals. To Texas Residents only. N. R. Brasted, 816 Sinclair Building, Fort Worth, Texas.

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

FOR SALE: 6 Blocks—from 320 to 2820 acres—Harding County, New Mexico—$3.00 per acre—all blocks neighboring each other—can be bought as one drilling block—consists of approximately 9200 acres. J. J. Enkich, 1207E-No. Osage Dr., Tulsa, Oklahoma.

FOR SALE: ½ interest of ⅜ working interest on 130 acres in Chautauqua County, Kansas—$4000—30 day drilling deal—shallow production—1000 ft. J. J. Enkich, 1207B-No. Osage Dr., Tulsa, Oklahoma.

80 ACRE LEASE, Marion County, Kansas. One new well pumping. Good for seven more wells. Box 646, Aberdeen, So. Dak.

WANTED—Lease blocks anywhere. Submit description, geology and terms. Box H-185, The Oil and Gas Journal, Tulsa, Oklahoma.

SWEETWATER CO., Wyo., 640 acres, 13N., 102W., and Sublette Co., 160 acres, 33N., 109W. $10.00 and 4%. Box H-244, The Oil and Gas Journal, Tulsa, Oklahoma.

SOUTHEAST GEORGIA Leases: One block, 50 thousand acres for a test. One block, 25 thousand acres, 25 cents acre bonus, details on request. Write Deming, Box 320, Waycross, Georgia.

FOR SALE: Water flood property, partly developed, near Walnut, Kans. Present production 400 bbl. per month. Deep Rock Oil Corp., J. A. Huitt, Tulsa, Okla.; W. E. Walter, Garnett, Kans.

WILL pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

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Physical evidence of production plus competent structure in Wyoming & New Mexico indicate great potential oil discoveries. Complete data to investors re-wells to be drilled, on request.
**W. J. PETERMAN, GEOLOGIST**
**1918-1954**
**Portales** **New Mexico**

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GEOLOGICAL MAPS and FILM. West Texas and southeast New Mexico. Scale 1"=8,000'. One set Permian datum, one set Pre-Permian datum. Sample and electric log datum. (Also film without datum). BASIN OIL MAP SERVICE, 1600 Bedford Drive, Midland, Texas.

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**Tulsa, Oklahoma**

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# Equipment Men

## Lucey Establishes Sales Office at Shreveport

To improve the service of its expanding business Lucey Products Corp. has established a sales office at Shreveport, La. Sam W. L. Backus and Henry C. Guynes have joined the Lucey organization to operate the new district.

S. W. L. BACKUS H. C. GUYNES

Backus has been active in the Ark-La-Tex area since 1919, having served with Oil Well Supply Co., Mid-Continent Supply Co., and Superior Iron Works & Supply Co. He was district manager when he resigned from Mid-Continent to become vice president and general sales manager for Superior, which position he held when he resigned to assume his new post with Lucey.

Guynes has also spent his oil-industry career in the Tri-State area, having been a member of the sales organizations of several of the leading suppliers in that territory since 1924. He resigned from Superior to join Lucey.

## Dewey Supply Co. Opens Ada Store

Dewey Supply Co. has opened a new store at Ada, Okla. The store is carrying a full line of rotary and production equipment. Store personnel servicing the Ada area for Dewey consist of: Leon Holderfield, store manager and field salesman; Red Rutherford, field salesman; and Hall Cavel, floorman and bookkeeper.

Dewey Supply now operates stores in Dewey, Skiatook, and Ada, Okla., with general offices in Tulsa.

**LEGAL**

Sealed bids for the lease of six tracts of tribal land and one tract of allotted land of the Agua Caliente Indian Reservation in Riverside County, California for oil and gas will be opened at 10:00 A.M. on June 28, 1954 at the Palm Springs Sub-Agency, Sacramento Area Office, Bureau of Indian Affairs, 132 North Indian Avenue, Palm Springs, California. This sale will be conducted under regulations as amended and promulgated by the Secretary of the Interior, 25 CFR 189 (Act of March 3, 1909, 35 Stat. 731, 783; 25 U.S.C. 396) governing the leasing of Allotted lands and 25 CFR 186 (Act of May 11, 1938, 52 Stat. 347; 25 U.S.C. 396-af) governing the leasing of Tribal Land. Bids must be submitted separately for each tract, but no objection will be offered to award of more than one parcel to the same successful bidder, and inclusion of such contiguous tribal parcels in the same lease. No conditional or alternate bids will be considered or accepted.

**Description of lands to be leased for oil and gas**
**T. 4 S., R. 5 E., S.B.M.**

| | No. Acres |
|---|---|
| Tribal Lands | |
| TRACT 1—S½ N½, Section 4 | 160 |
| TRACT 2—N½ S½, Section 12 | 160 |
| TRACT 3—S½; S½ NW¼; SW¼ NE¼, Section 14 | 440 |
| TRACT 4—NW¼; W½ NE¼; SE¼ NE¼; N½ SW¼; SE¼ SW¼; SE¼ Section 22 | 560 |
| TRACT 5—S½; NW¼; W½ NE¼, Section 24 | 560 |
| TRACT 6—N½ N½, Section 26 | 160 |
| Alotted Land | |
| TRACT 7—NE¼ NE¼, Section 22 | 40 |
| TOTAL | 2,080 |

The terms of the lease include the payment of a bonus as bid, a rental of $1.25 per acre per annum and a royalty of 12½% of the value or amount of all oil, gas, and/or natural gasoline, and/or all other hydrocarbon substances produced and saved from the land leased herein. The period of the lease is for 10 years from date of approval by the Commissioner of Indian Affairs and as much longer as the substances specified are produced in paying quantities. Leases will be sold for a bonus offer upon an acreage basis and no drilling proposition will be considered as a part of a bonus offer. The adequacy of bonus offers will be considered by the United States Geological Survey. Bids should be plainly marked on the outside of the envelope "Bid for oil and gas gas lease on Indian land." No bid received later than 10:00 A.M. on June 28, 1954 can be considered. Bids may be delivered in person or mailed to Palm Springs Sub-Agency, Sacramento Area Office, U. S. Bureau of Indians Affairs, P. O. Box 1229, Palm Springs, California. Bidders and interested parties may be present at the time bids are opened. Each bid must be accompanied by a certified check, cashier's check or postal money order payable to the order of THE TREASURER OF THE UNITED STATES for at least 20% of the bonus bid and of the

first year's rental. Awards will be made to the highest acceptable bidder. In the event two or more bids are in the same amount and such bids are the high bids, the bidders submitting such bids may be required to draw lots to determine the successful bidder. The Commissioner of Indian Affairs, however, reserves the right to reject any or all bids. Deposits of unsuccessful bidders will be returned immediately after the bids are opened. All successful bidders will be required to obtain the signatures of the Indian lessors. Successful bidders must complete and return leases and all supporting papers within 20 days from date of award together with the balance of the bonus payment, full payment of the first year's rental, $5.00 lease fee and $1.00 for each set of forms and the cost of advertising. An additional period of time will be granted for good and sufficient reason upon request prior to expiration of the original 20-day period. The Area Director reserves the right, as a condition precedent to the granting of any extension for filing a completed lease, to require the deposit of any remaining sums due and owing on the lease including the 80 per cent of the bonus bid and the first year's rental. In additional to all other remedies provided by law, failure of the successful bidder to comply with the terms of the sale will render all deposits theretofore made by or due from him subject to forfeiture without further action on the part of this office. The right is reserved to reject any and all bids and to disapprove and reject prior to approval any leases made on an accepted bid; and should any bids be rejected or lease disapproved through no fault of the bidder, all deposits except the cost of advertising this lease sale shall be returned to the bidder. Lessees shall furnish with each lease, a bond with an acceptable company authorized to act as sole surety. Such bond shall be in amount as follows: For less than 80 acres, $1,000; for 80 acres and less than 120 acres, $1500; for 120 acres and not more than 160 acres, $2000; and for each additional 40 acres, or part thereof, above 160 acres, $500.: PROVIDED, That a lessee may file one bond in the sum of $15,000., covering all leases to which he is a party. The right is reserved at any time before or after approval of the lease to increase the amount of a bond above the sum named, in any case where the Secretary of the Interior deems it proper to do so. Lessees will be held responsible for complying with the requirements of the Federal Documentary Stamp Statutes. The parties to each lease shall agree to subscribe to and abide by any agreement for the cooperative or unit development of the field or area, affecting the leased lands, or any pool thereof, if and when collectively adopted by a majority operating interest therein and approved by the Secretary of the Interior, during the period of supervision. If the applicant for a lease is a corporation, it shall file with the lease evidence of authority of its officers to execute papers; and with its first application it shall also file a certified copy of its articles of incorporation, and, if foreign to the state in which the lands are located, evidence showing compliance with the corporation laws thereof. Further information regarding the leasing of these lands for oil and gas may be obtained from the District Agent, Palm Springs Sub-Agency, 132 North Indian Avenue (P. O. Box 1229), Palm Springs, California, at any time before the date of the opening of the bids. Leonard M. Hill, Area Director.

## LEGAL

Notice is hereby given that sealed bids for oil and gas leases on approximately 24,794.20 acres of Allotted restricted Indian lands in Roosevelt and Daniels Counties on the Fort Peck Indian Reservation, State of Montana, will be opened at 2:00 o'clock, P.M., Mountain Standard Time, June 30, 1954, at the Fort Peck Indian Agency, Poplar, Montana. Those individuals desiring specific information in connection with this sale may contact the Superintendent, Fort Peck Indian Agency, Poplar, Montana, or telephone, Poplar, 2181.

## LEGAL

Notice is hereby given that sealed bids for oil and gas leases on approximately 8,040.85 acres of Tribal restricted Indian lands in Roosevelt and Daniels Counties on the Fort Peck Indian Reservation, State of Montana, will be opened at 2:00 o'clock, P.M., Mountain Standard Time, June 16, 1954, at the Fort Peck Indian Agency, Poplar, Montana. Those individuals desiring specific information in connection with this sale may contact the Superintendent, Fort Peck Indian Agency, Poplar, Montana, or telephone, Poplar, 2181.

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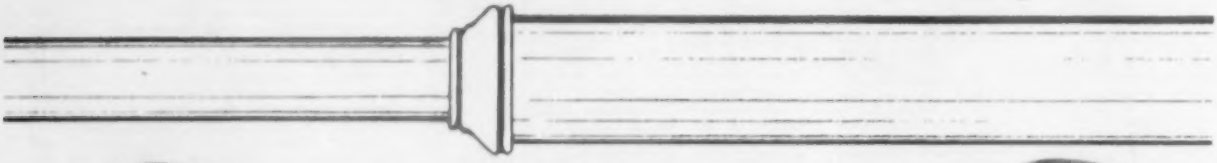
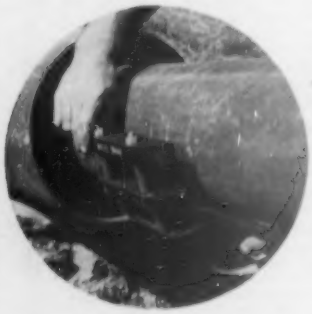
Completely insulated steel band with only one joint to be opened wide for installation. Hard rubber skids support pipe in center of casing. Assembly clamped by plastic-covered aircraft cables.





**New CENTERING CRADLE**
A short, massive Concentric-Support Insulator. Simply slide Cradle in casing end to carry weight of pipe and backfill. Replaces Insulator in end of casing.

**New STYLE 2 THINSULATOR**
Similar to "BT" Insulator except with steel skids throughout. Excellent for soft coatings — but does NOT center pipe in casing.

## SPECIAL FOR DISTRIBUTION AND GATHERING LINES

**New DO-NUT BUSHING**
Thick, synthetic rubber ring dimensioned to grip the pipe when hammered into casing. Ideal for pipe of 6" size and smaller.

**STYLE 1 THINSULATOR**
Thin Insulator with rubber-lined steel band for 10" and smaller pipe in casing only 2" larger. Welded steel skids on bottom only where joint is bolted.

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** Specific features of devices illustrated on this page are covered by U. S. Patents or Patents Pending.*

*† A manufacturer who renders FREE service in the field to help insure correct installations.*

T.D. Williamson, Inc.
THE PIG WITH THE POKE
CLEANS PIPE LINES
P. O. BOX 4038
TULSA 9, OKLAHOMA

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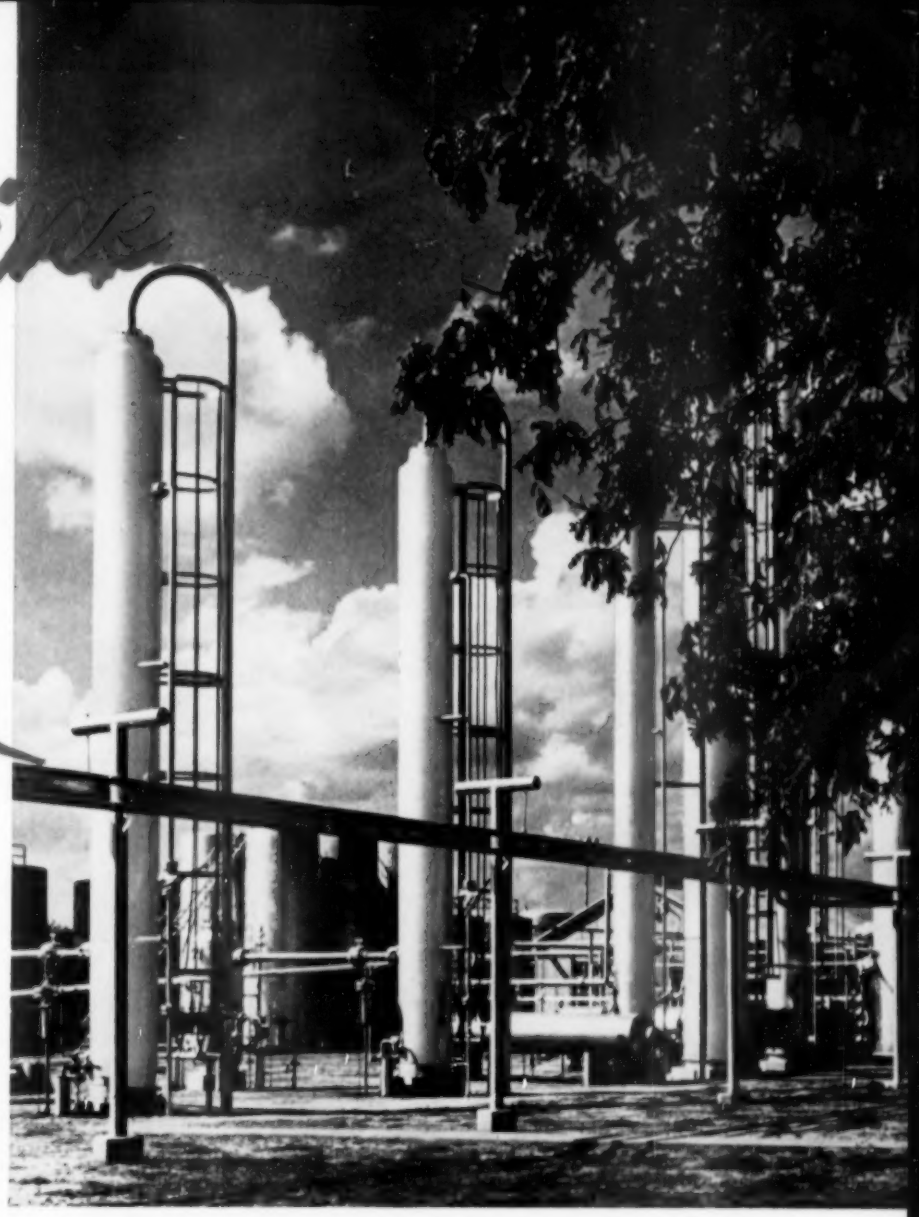
# Skyline by Wyatt



• Whenever the oil search comes up with a major strike of condensate, recovery must take place on the spot and the industry widens its processing skyline by calling for the skill of Wyatt fabrication.

MANUFACTURERS AND ERECTORS SINCE 1913

# *Make your Drill Stem dollar go farther*

Records show that HUGHES Flash-Weld tool joints cost you less per foot of hole drilled. They are more economical because they last the life of your drill stem. And they may be safely rehardfaced in the field to withstand the wear of extremely abrasive formations.

Since 1938, more than 32,000,000 feet of drill pipe have been unitized with HUGHES Flash-Weld tool joints. When you specify HUGHES Flash-Weld you get the *original* integrally-welded tool joint . . . and the benefit of the industry's greatest flash-welding experience.

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